

**APPENDIX K – SUNZIA PROJECT PRELIMINARY EMF
AND CORONA EFFECTS STUDY**

February 8, 2011

SOUTHWESTERN POWER GROUP

SunZia Project *Preliminary EMF and Corona Effects Study*

Revision 1

PROJECT NUMBER:
116500

PROJECT CONTACT:
ROB SCHAEERER, P.E.
EMAIL:
ROBERT.SCHAEERER@POWERENG.COM
PHONE:
858-503-5975

PROJECT CONTACT:
JOSH BROWN
EMAIL:
JOSH.BROWN@POWERENG.COM
PHONE:
503-293-7114

PROJECT CONTACT:
JOHN SQUIRE, P.E.
EMAIL:
JSQUIRE@POWERENG.COM
PHONE:
503-293-7164



Preliminary EMF and Corona Effects Study

Prepared by POWER Engineers, Inc. for

Southwestern Power Group

SunZia Project

For additional information contact:

Rob Schaerer, P.E. (858) 503-5975

robert.schaerer@powereng.com

Josh Brown (503) 293-7114

josh.brown@powereng.com

John Squire, P.E. (503) 293-7164

jsquire@powereng.com

Rev.	Issue Date	Issued For	Prep By	Chkd By	Appd By	Notes
A	11/1/2010	Appvl	RES	JAB	JFS	Issued for client review
0	1/28/2011	Impl	JAB	RES	JFS	Issued for client use
1	2/8/2011	Impl	JAB	RES	JFS	Reissued per client comments

“Issued For” Definitions:

- “Prelim” means this document is issued for preliminary review, not for implementation
- “Appvl” means this document is issued for review and approval, not for implementation
- “Impl” means this document is issued for implementation
- “Record” means this document is issued after project completion for project files

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
1.1 Project Discussion.....	1
1.2 Summary	1
2.0 DATA	1
3.0 ANALYSIS	2
4.0 RESULTS OF VARIOUS CONDUCTOR CONFIGURATIONS	4
4.1 Electric Field.....	4
4.2 Magnetic Field	6
4.3 Audible Noise	8
4.4 AM Radio Interference	10
4.5 Television Interference	13
5.0 RESULTS OF INCREASING LINE VOLTAGE.....	15
5.1 Electric Field.....	15
5.2 Magnetic Field	16
5.3 Audible Noise	17
5.4 AM Radio Interference	18
5.5 Television Interference	18
6.0 RESULTS OF ADDING A SECOND LINE	20
6.1 Electric Field.....	20
6.2 Magnetic Field	21
6.3 Audible Noise	22
6.4 AM Radio Interference	24
6.5 Television Interference	25
7.0 GENERAL SUMMARY OF RESULTS.....	26
APPENDIX A – TRANSMISSION LINE STRUCTURE DRAWINGS.....	27

LIST OF TABLES

Table 1: Electric Field Results for Various Configurations [kV/m]	4
Table 2: Magnetic Field Results for Various Configurations – 100% Loading [mG]	6
Table 3: L50 Audible Noise Results for Various Configurations (Foul Weather) [dBA]	8
Table 4: L50 Radio Interference for Various Configurations (Fair Weather) [dB μ V/m @ 1 MHz]	11
Table 5: Television Interference for Various Configurations [dB μ V/m @ 75 MHz]	13
Table 6: Electric Field Results for Different Voltages [kV/m]	16
Table 7: L50 Audible Noise Results for Different Voltages (Foul Weather) [dBA]	17
Table 8: L50 Radio Interference for Different Voltages (Fair Weather) [dB μ V/m @ 1MHz]	18
Table 9: Television Interference for Different Voltages [dB μ V/m @ 75 MHz]	19
Table 10: Electric Field Results for Two Circuits [kV/m]	20
Table 11: Magnetic Field Results for Two Circuits – 100% Loading [mG]	21
Table 12: L50 Audible Noise Results for Two Circuits (Foul Weather) [dBA]	23
Table 13: L50 Radio Interference for Two Circuits (Fair Weather) [dB μ V/m @ 1MHz]	24
Table 14: Television Interference for Two Circuits [dB μ V/m @ 75 MHz]	25

LIST OF FIGURES

Figure 1: Electric Field Across ROW for Various Configurations	5
Figure 2: Electric Field for Five Miles Beyond ROW for Various Configurations	5
Figure 3: Magnetic Field Across ROW for Various Configurations	7
Figure 4: Magnetic Field for Five Miles Beyond ROW for Various Configurations	7
Figure 5: Audible Noise Across ROW for Various Configurations	9
Figure 6: Audible Noise for Five Miles Beyond ROW for Various Configurations	9
Figure 7: Corona Effects with Increasing Frequency	10
Figure 8: AM Radio Interference Across ROW for Various Configurations	12
Figure 9: AM Radio Interference for Five Miles Beyond ROW for Various Configurations	12
Figure 10: Television Interference Across ROW for Various Configurations	14
Figure 11: Television Interference for Five Miles Beyond ROW for Various Configurations	15
Figure 12: Electric Field Across ROW for Different Voltages	16
Figure 13: Audible Noise Across ROW for Different Voltages	17
Figure 14: AM Radio Interference Across ROW for Different Voltages	18
Figure 15: Television Interference Across ROW for Different Voltages	19
Figure 16: Electric Field Across ROW for Two Circuits	21
Figure 17: Magnetic Field Across ROW for Two Circuits	22
Figure 18: Audible Noise Across ROW for Two Circuits	23
Figure 19: AM Radio Interference Across ROW for Two Circuits	24
Figure 20: Television Interference Across ROW for Two Circuits	25
Figure 21: Horizontal Transmission Structure Configuration	28
Figure 22: Delta Transmission Structure Configuration	29
Figure 23: DC Tower Configuration	30

1.0 INTRODUCTION

1.1 Project Discussion

Southwestern Power Group (SWPG) is the project manager for the development of the SunZia Southwest Transmission Project, which includes approximately 500 miles of 500 kV transmission lines. This project would consist of one or two 500 kV lines in parallel running from central Arizona in to central New Mexico to transport primarily renewable energy into areas of demand. The Project is being permitted to accommodate a single 500 kV AC transmission line with an expected capacity of 1,500 MW and a future second 500 kV transmission line that would be either an AC line rated at 1,500 MW or a DC line rated at 3,000 MW.

POWER Engineers, Inc.'s (POWER) engineering service for this study was to perform calculations to determine the field and corona effects of the transmission line(s) and compare the results to applicable standards and guidelines. The analysis included determining predicted electric and magnetic fields, audible noise, and AM radio and television interference.

1.2 Summary

Electric and magnetic fields (EMF) and corona effect levels have been analyzed for a variety of conductor configurations and two structure types for the first AC transmission line. In addition, the effects of increased line voltage and adding a second line in parallel were examined. Electric and magnetic fields were analyzed at a minimum conductor height. Audible noise (AN), radio interference (RI) and television interference (TVI) were analyzed at average conductor height. Values calculated are typically below common limits and guidelines for each effect. Based on the results of the analysis, radio frequency interference from the proposed 500 kV transmission lines is expected to be relatively low within a few miles of the line for frequencies near 1 MHz, and near negligible as the frequency increases. Specific frequencies of concern could be analyzed for more exact values and their behavior with varying distance from the line. Calculations were based on preliminary structure designs that may change as detailed design is performed. Any changes to the characteristics of the conductors or their arrangement could affect the results of the study and should be further investigated.

2.0 DATA

EMF, audible noise, and radio and television interference from a transmission line are based on the electrical and physical characteristics of the transmission line. Specifically, these factors are driven by: the voltage and current loading of the line; the physical conductor characteristics and bundling; relationships of each phase conductor to the other phases and shield wires; and the heights of the conductors from the ground. The following data was used for the analysis. Should any of this data change, the results will also change.

- For the 500 kV line, a maximum operating voltage of 105 % of nominal voltage was used for electric field, audible noise, radio interference and television interference analysis, except where otherwise noted.

- Additional sensitivity cases were run for a single line to examine the change in effects at 110%, 115%, and 120% of nominal voltage as portions of these lines may experience higher voltage due to reactive compensation installed for the long lines.
- A maximum loading of 1,650 amps per phase (1,500 MVA nominal at 105% of nominal voltage) was assumed for each 500 kV AC line analysis. For DC analysis, a pole current of 3,000 amps was used. Balanced loading was assumed for all cases.
- Three conductor bundling configurations were examined on the base AC horizontal guyed V structure, all with 18 inch bundle spacing:
 - A 3-bundle 1590 kcmil ACSR Lapwing conductor (base case)
 - A 4-bundle 954 kcmil ACSR Rail conductor (as a mitigation option)
 - A 4-bundle 1590 kcmil ACSR Lapwing conductor (as a mitigation option)
- A delta structure was also examined as a mitigation option for the base AC line, using the initial 3-bundle 1590 kcmil ACSR Lapwing conductor.
- There are two shield wires on each structure:
 - One 7/16 inch EHS steel
 - One optical ground wire (OPGW) GW4830 (diameter 0.669)
- The conductor spacing and arrangement was assumed as labeled on the structure drawings provided for reference in Appendix A. The assumed phasing for this first line is A-B-C, left to right, although with one line, the actual phasing has no effect.
- The phasing of the second AC circuit was varied to show the effects of different phasing arrangements between the two circuits. The second AC line was assumed to also be a horizontal configuration as the delta configuration does not provide significant benefit.
- If the second line is DC, the positive pole is assumed to be on the inside side of the ROW (adjacent to the AC line). If the positive and negative poles are swapped, there will be slight changes in the DC fields.
- The Right-of-Way (ROW) width is assumed to be 200 feet centered on the structure. For a second line, it is assumed that an identical ROW would be located immediately adjacent, for a separation of 200 feet from centerline to centerline of the structures.
- A maximum sag value of 57.5 feet was used for the AC phase conductors, while the shield wires sag 85% of this value.
- A maximum sag value of 65 feet was used for the DC pole conductors, while the shield wires sag 85% of this value.
- Calculations were based on an assumed elevation of approximately 5,000 feet, based on the typical elevations in the area of this project of greatest concern (near the White Sands Missile Range (WSMR)). The actual elevation of the line varies from around 2,000 feet in the west to 6,000 feet in the east.

3.0 ANALYSIS

The environmental field effects analysis for AC cases was performed using the Bonneville Power Administration's (BPA) Corona and Field Effects Program (CAFEP) software on the various transmission line structure and conductor configurations. CAFEP uses the electrical and physical

characteristics of the transmission line to calculate resulting fields and interference effects from the transmission lines. It should be noted that the radio interference values calculated by CAFEP are 2 dB greater than would be measured with modern equipment using the standard IEC/CISPR quasi-peak detector; therefore the RI results in this report are adjusted down by 2 dB to account for the change.

For the AC/DC hybrid transmission line corridor SESEnviroPlus (Enviro) by Safe Engineering Services & technologies ltd. was used. This software package was used due to the fact that the CAFEP is incapable of performing analysis on multiple frequencies at the same time. Enviro allows more flexibility in computation of audible noise and radio interference. For consistency BPA methods were used to produce results included in this report.

The electric fields, audible noise, and radio and television interference are all driven by the maximum operating voltage of conductors. Magnetic fields are driven by the line current loading, which varies over time, and not by the sub-conductor size or configuration. The magnetic fields calculations were performed at the maximum line loading and can be scaled down proportionally to the actual loading of the line.

The values of these effects are typically of concern at various points across the ROW. Therefore, values reported include the maximum and average values within the ROW for the given scenarios, along with the calculated values at the edge of the ROW. Also included for reference are plots of the results for all analyzed values across the entire width of the ROW and slightly beyond the ROW. Since this project will be constructed near sensitive sites, plots are also included showing the values extending approximately 5 miles to either side of the corridor.

For the analysis, electric and magnetic fields were analyzed at a minimum conductor height (mid-span, maximum sag), as this location will produce the worst case scenario. Audible noise, radio interference, and television interference were analyzed at the average conductor height along a span, as these effects are generally a concern over a larger area, and not immediately under the mid-span of the line.

Once values are calculated, they can be compared to local, statewide, or national guidelines and/or limits. However, no requirements were presented that would apply to this specific installation. Therefore, typical guidelines are presented for reference at this point. If specific limits for the WSMR or other regulatory agencies are presented at a later time, they can be examined and referenced in future versions of this report.

The two states involved in this project do not have any limits on electric or magnetic fields. However, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) publishes recommended limits (called reference limits) for electric and magnetic fields based on a collaboration of international scientists. The guidelines are non-binding and are more stringent than the guidelines presented by the Institute of Electrical and Electronics Engineers (IEEE). These values are expressed as reference exposure limits for both occupational and general public exposure. These limits are discussed in the results sections.

Nationally and in these states, audible noise from a transmission line has no regulated limit. However, the Environmental Protection Agency (EPA) provides a recommended limit of 55 dBA for outdoors for a day-night average sound level. Radio and television interference is driven by the signal-to-noise ratio, which depends on the broadcast source and frequencies. Some typical guidelines are discussed in the results section.

4.0 RESULTS OF VARIOUS CONDUCTOR CONFIGURATIONS

This section covers the examination of the various sub-conductor bundle configurations, as well as the alternate delta structure design. Typically, increasing the size or number of conductors will increase the electric field, have no effect on magnetic field, and will reduce the audible noise, radio interference, and television interference levels.

4.1 Electric Field

The electric field strength is a measure of the force per unit charge at a given point in space relative to a charged object. It is typically measured in kilovolts per meter (kV/m). Table 1 shows a summary of the values in the ROW for each configuration for a single transmission line. Values are calculated at the minimum conductor height (mid-span) at a height of one meter above the ground per IEEE Standard 644-1994 (R2008).

Table 1: Electric Field Results for Various Configurations [kV/m]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Horizontal 3-Bundle Lapwing	2.6	8.6	6.2
Horizontal 4-Bundle Rail	2.8	9.2	6.6
Horizontal 4-Bundle Lapwing	2.8	9.3	6.7
Delta 3-Bundle Lapwing	1.1	8.3	4.5

* Average values based on data points calculated every five feet across the ROW width.

ICNIRP reference levels for electric field strength are 8.33 kV/m for occupational exposure and 4.16 kV/m for general public exposure. Values beyond the ROW are below the ICNIRP reference level for general public exposure.

Figure 1 and Figure 2 (on the following page) respectively show plots of the electric field across the ROW and for five miles beyond the ROW for the various configurations. The red line indicates the ICNIRP reference level for the general public (beyond the ROW) as a reference. Increasing the size or number of conductors will increase the maximum electric fields, while using a delta configuration will reduce the electric fields. Once more than a few hundred feet from the edge of the ROW, the values will be practically zero.

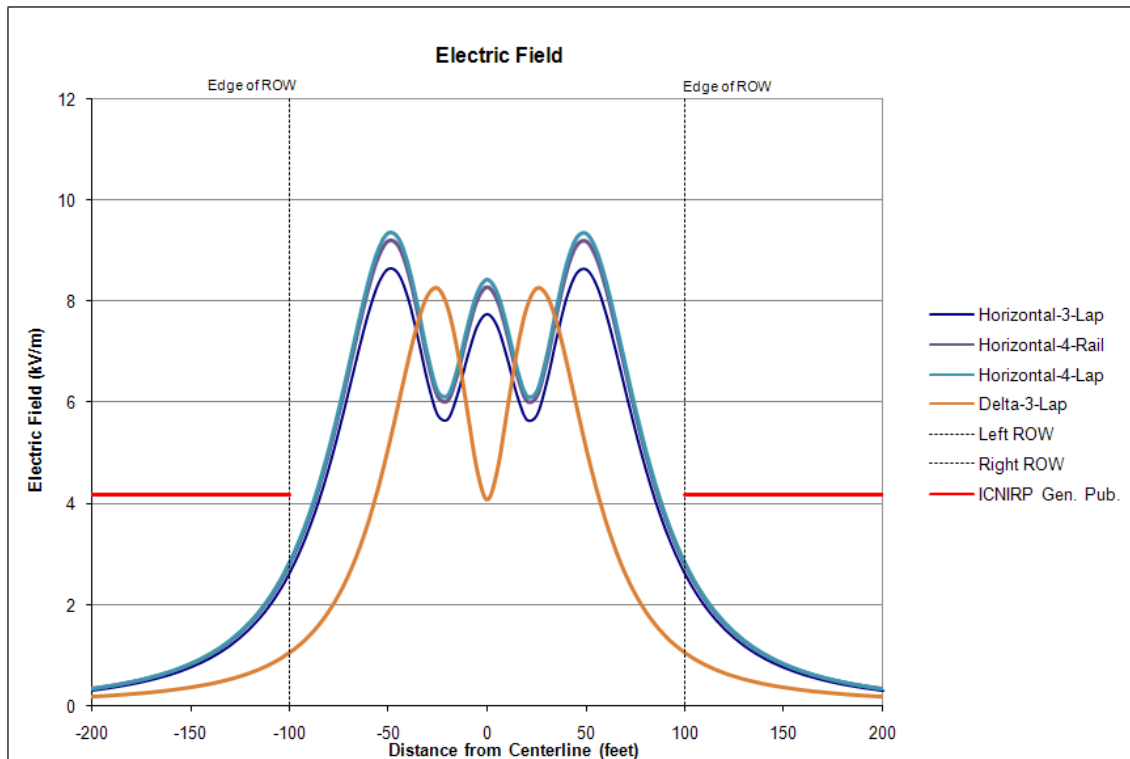


Figure 1: Electric Field Across ROW for Various Configurations

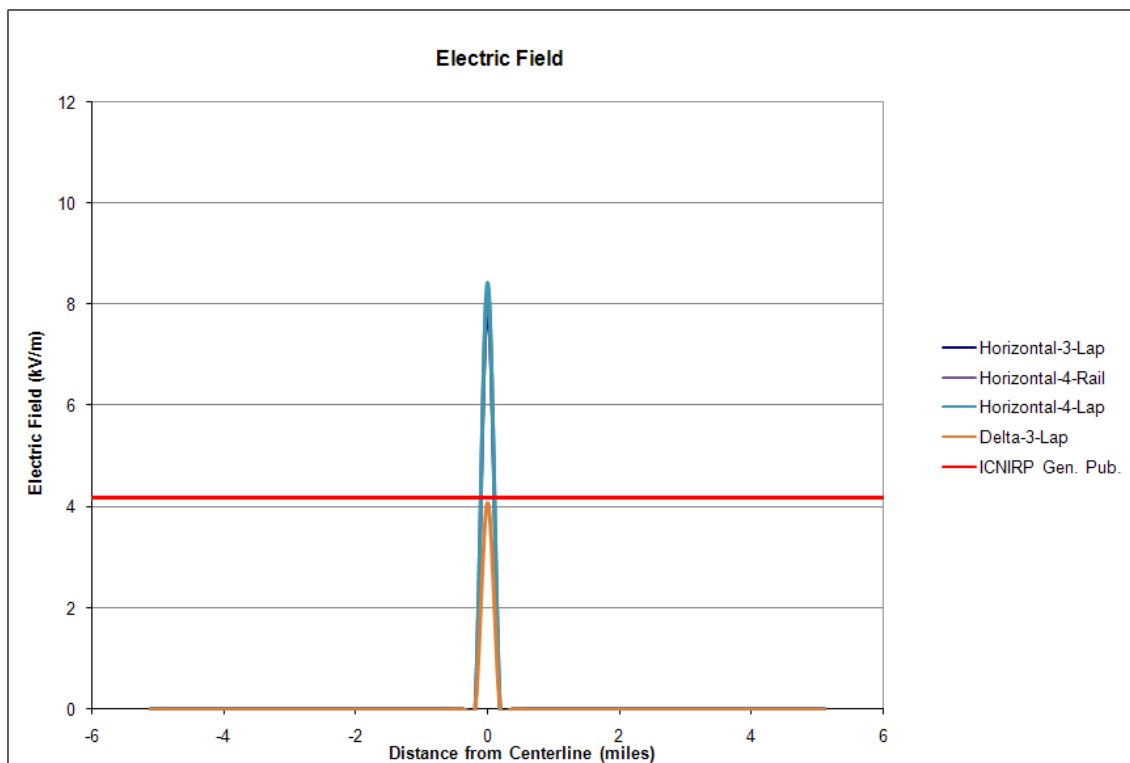


Figure 2: Electric Field for Five Miles Beyond ROW for Various Configurations

4.2 Magnetic Field

The reported magnetic field values are the magnetic flux density at a given point in space. Magnetic flux density is measured in gauss or milligauss (mG) or in micro-Teslas (μT). These values can be easily converted as one tesla equals 10,000 gauss, or simply 10 mG equals 1 μT .

Table 2 shows a summary of the resulting values in the ROW for each configuration for a single transmission line, assuming maximum current loading. All values are calculated assuming balanced loading on all three phases. The magnetic fields will vary if there is unbalance on the system; however, transmission unbalance is typically fairly low. Note that the results are directly proportional to the loading of the line; therefore, 50% loading would be exactly half of the 100% loading condition. Also note that the values are independent of the sub-conductor size. Values are calculated at the minimum conductor height (mid-span) at a height of one meter above the ground per IEEE Standard 644-1994 (R2008).

Table 2: Magnetic Field Results for Various Configurations – 100% Loading [mG]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Horizontal 3-Bundle Lapwing	89.4	294.5	217.5
Horizontal 4-Bundle Rail	89.4	294.5	217.5
Horizontal 4-Bundle Lapwing	89.4	294.5	217.5
Delta 3-Bundle Lapwing	41.0	265.3	141.3

* Average values are based on data points calculated every five feet across the ROW width.

ICNIRP reference levels for magnetic flux density are 4,167 mG for occupational exposure and 833 mG for general public exposure. None of the configurations in this analysis exceed the ICNIRP limits for general public exposure. The ICNIRP reference level for general public (beyond the ROW) is also included in the associated plots.

Figure 3 and Figure 4 (on the following page) respectively show a plot of the magnetic field at 100% loading across the ROW and extending five miles beyond the ROW, for the two structure configurations. Again, since the magnetic field is directly proportional to the line current loading, values at 50% loading will follow the same plot shape but will be 50% of the magnitude.

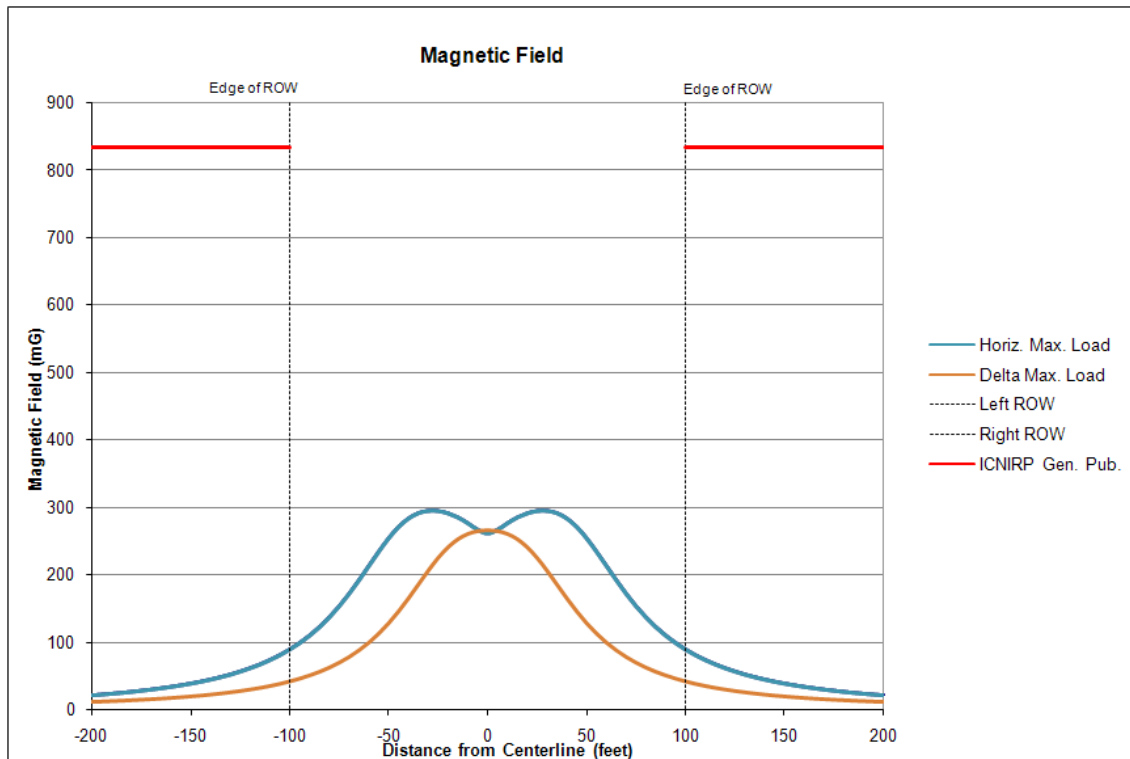


Figure 3: Magnetic Field Across ROW for Various Configurations

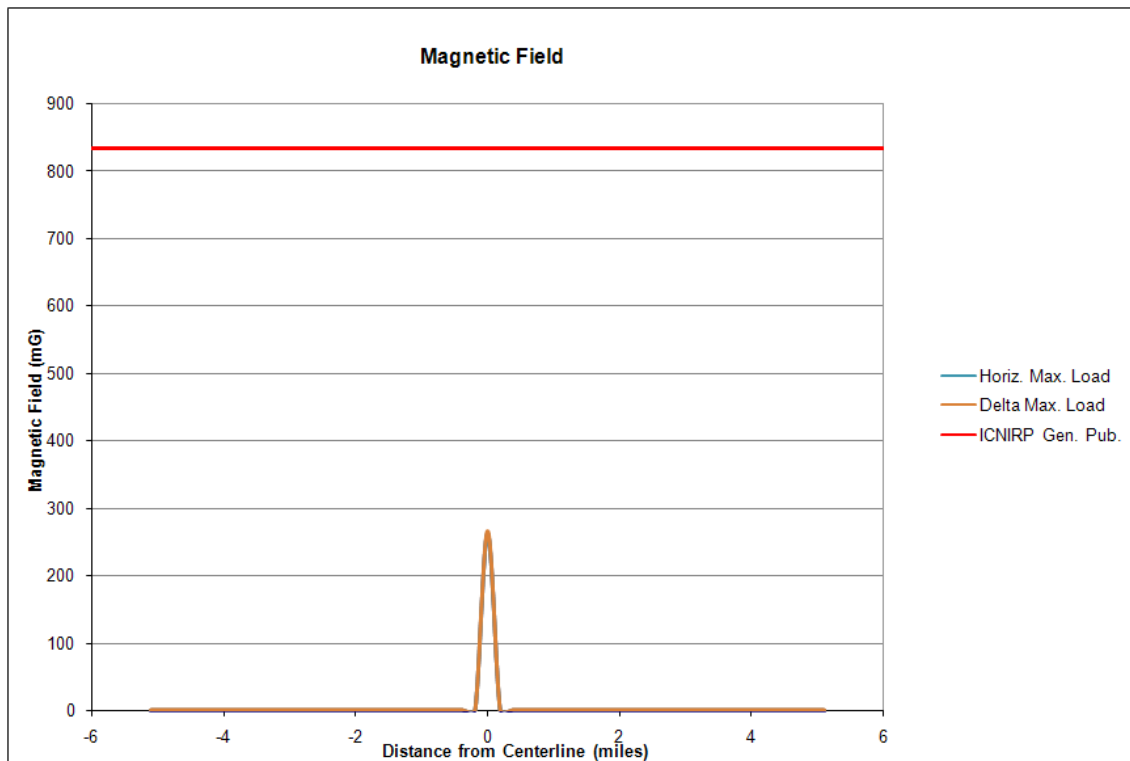


Figure 4: Magnetic Field for Five Miles Beyond ROW for Various Configurations

4.3 Audible Noise

Audible noise is measured as an equivalent A-weighted sound-pressure level in decibels (dBA). The L_{50} Audible Noise (Foul Weather) values represent a predicted average (L_{50}) noise levels present when foul weather conditions cause the conductors to become wet. The actual value is expected to be at or below this calculated L_{50} value 50% of the time, and above the value the other 50% of the time. Values are calculated at a height of five feet above the ground per IEEE Standard 656-1992, using the average conductor height to approximate the average values along the entire line.

Table 3 shows a summary of the audible noise levels in the ROW for each configuration for a single transmission line.

Table 3: L50 Audible Noise Results for Various Configurations (Foul Weather) [dBA]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Horizontal 3-Bundle Lapwing	45.0	48.1	46.8
Horizontal 4-Bundle Rail	43.3	46.4	45.1
Horizontal 4-Bundle Lapwing	38.7	41.8	40.5
Delta 3-Bundle Lapwing	47.4	50.4	49.1

* Average values based on data points calculated every five feet across the ROW width.

No guidance was provided on limits for audible noise for this line route; however, EPA guidelines recommend levels below 55 dBA for a day-night average in the outdoors. If applied to transmission lines, this is often measured at the edge of the ROW. The values across the entire ROW are all below this EPA recommendation for all configurations.

Figure 5 and Figure 6 (on the following page) respectively show a plot of the audible noise levels across the ROW and extending five miles beyond the ROW for the various configurations. In addition, these figures show the EPA recommended level as a red line beyond the ROW.

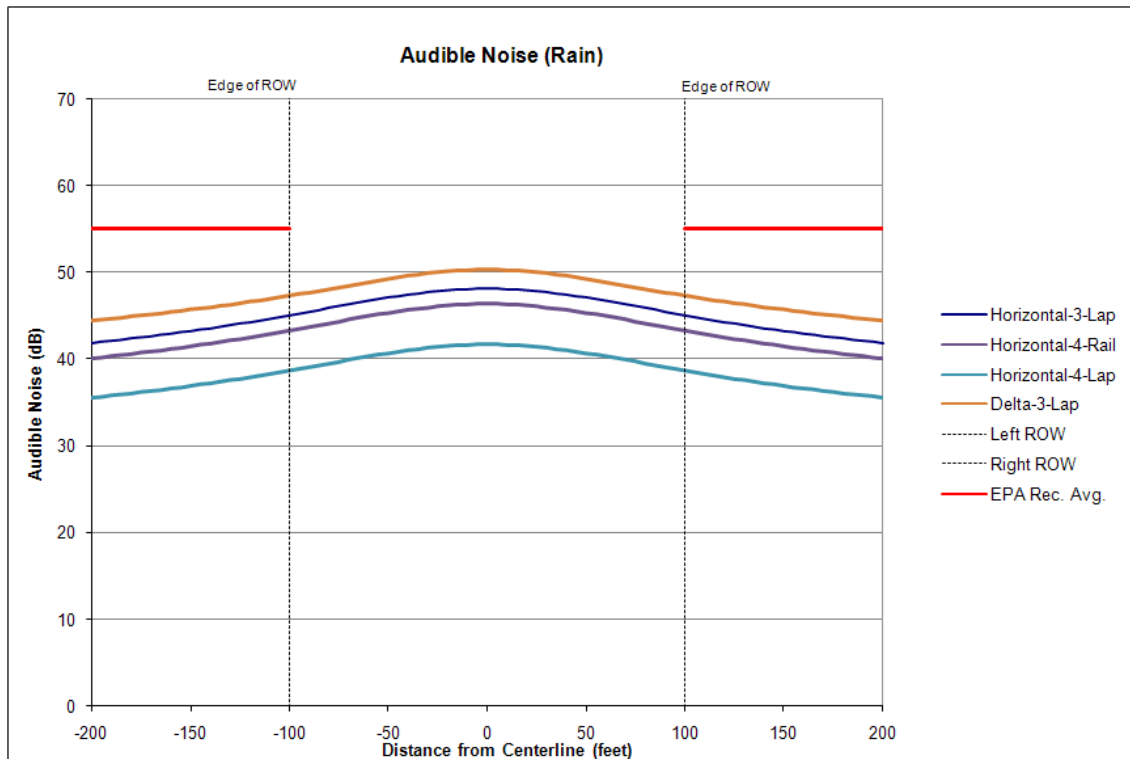


Figure 5: Audible Noise Across ROW for Various Configurations

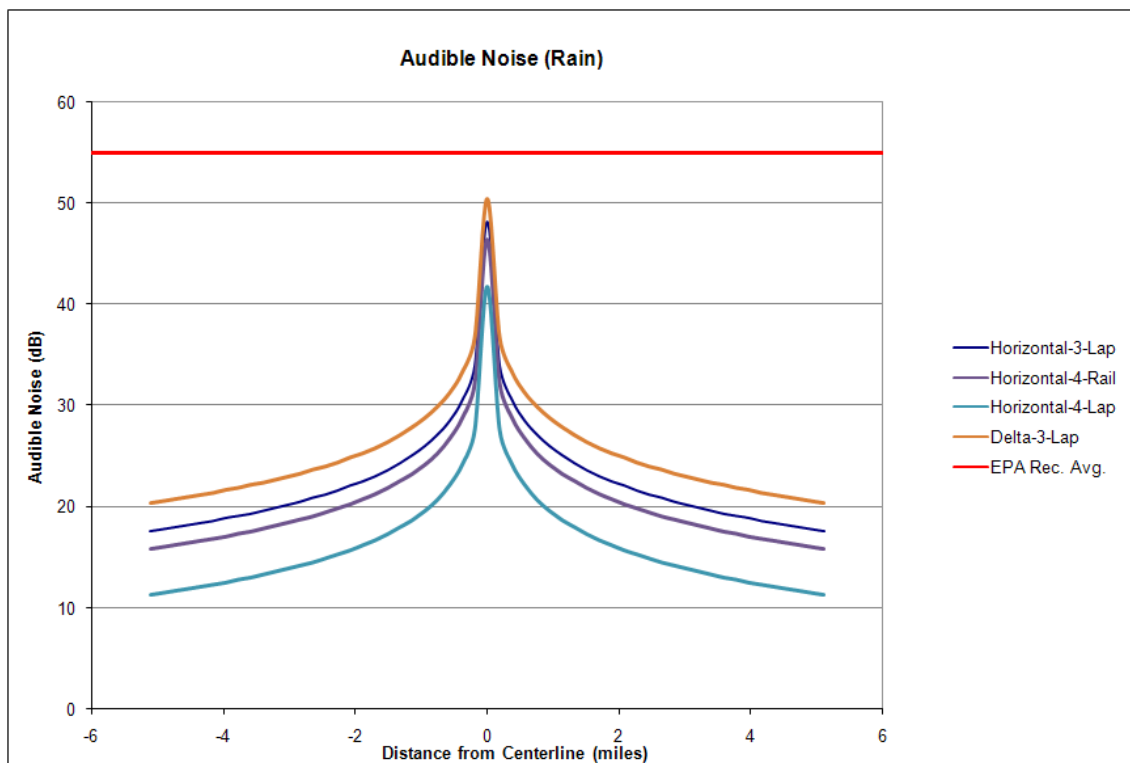


Figure 6: Audible Noise for Five Miles Beyond ROW for Various Configurations

4.4 AM Radio Interference

Radio interference is the degradation of a radio signal by radio frequency electromagnetic disturbances and is reported as the field strength of the interference. It is often measured in decibels (dB) of one microvolt per meter ($\mu\text{V}/\text{m}$), which is a logarithmic scale. The L_{50} Radio Interference (Fair Weather) values represent the predicted average levels present when conductors are dry. Note that interference values will increase during foul weather conditions; however, other atmospheric conditions will typically have a greater degradation of AM radio signals during this scenario.

The actual value of radio interference is expected to be at or below this calculated L_{50} value 50% of the time, and above the value the other 50% of the time. Values are calculated at a height of six feet above the ground and at 1 MHz, using the average conductor height to approximate the average values along the entire line. IEEE Standard 430-1986 suggests that these measurements are taken no greater than two meters above the surface.

Radio frequency and television interference is also dependent on frequency. As the frequency of desired received signal goes up the interference produced by corona goes down. This effect is most prominent in frequencies above 1 MHz. Figure 7 below (Figure 8.5-2 from the EPRI AC Transmission Line Reference Book, Third Edition) shows the magnitude of the corona decreasing as frequency goes up. As the magnitude of the corona decreases the radio interference effects diminish as well.

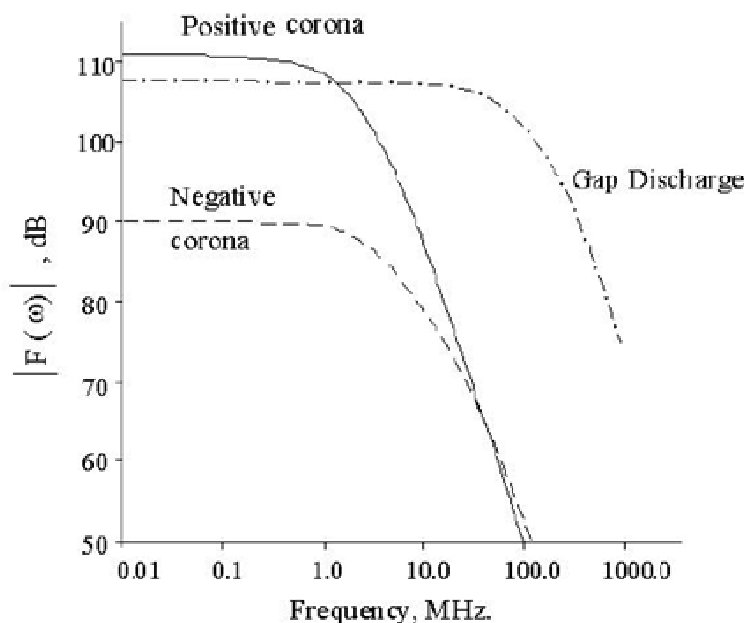


Figure 7: Corona Effects with Increasing Frequency

Radio interference is affected by both the signal strength, as well as the level of interference (noise). The signal-to-noise ratio (SNR) is simply the signal strength in dB minus the calculated interference (noise) level in dB. Depending on location, the signal strength can vary significantly; therefore the amount of interference that is tolerable varies as well. Guidance provided by the EPRI AC Transmission Line Reference Book indicates that the amount of radio interference should be below 38 dB at 100 feet from the outermost conductor (or often examined at the edge of ROW). This is only a rough guideline, and without actual signal strength measurements and data from the FCC on the protected signal contours (within which the signals are protected from interference) for radio stations in the area, can only provide a typical idea of if there may be concerns.

Table 4 shows a summary of the radio interference levels in the ROW for each configuration.

Table 4: L50 Radio Interference for Various Configurations (Fair Weather) [dBμV/m @ 1 MHz]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Horizontal 3-Bundle Lapwing	37.5	47.7	43.2
Horizontal 4-Bundle Rail	34.5	44.8	40.3
Horizontal 4-Bundle Lapwing	28.2	38.6	34.0
Delta 3-Bundle Lapwing	38.6	47.8	44.3

* Average values based on data points calculated every five feet across the ROW width.

Figure 8 and Figure 9 respectively show a plot of the radio interference levels across the ROW and extending five miles beyond the ROW for the various configurations. All configurations indicate values below the 38 dB recommendation at 100 feet from the outermost conductor, as can be seen in the following figures. In addition, all horizontal configurations are below the limit at the edge of ROW, as shown by the red line on the plots. However, as this is only a guideline, it is possible that some stations that have low signal strength in the area may suffer from some interference. Similarly, these values are calculated at 1 MHz and will decrease with increasing frequency, or increased separation between the line and antenna.

It is important to note that these values are based on a 1 MHz amplitude modulated signal. Most modern communications systems use either frequency modulation or spread spectrum techniques, and broadcast at higher frequencies. In addition, the signals are often digital which are typically more immune to interference. It is anticipated that most other communications signals would be able to function properly even with the effects of these transmission line interference results.

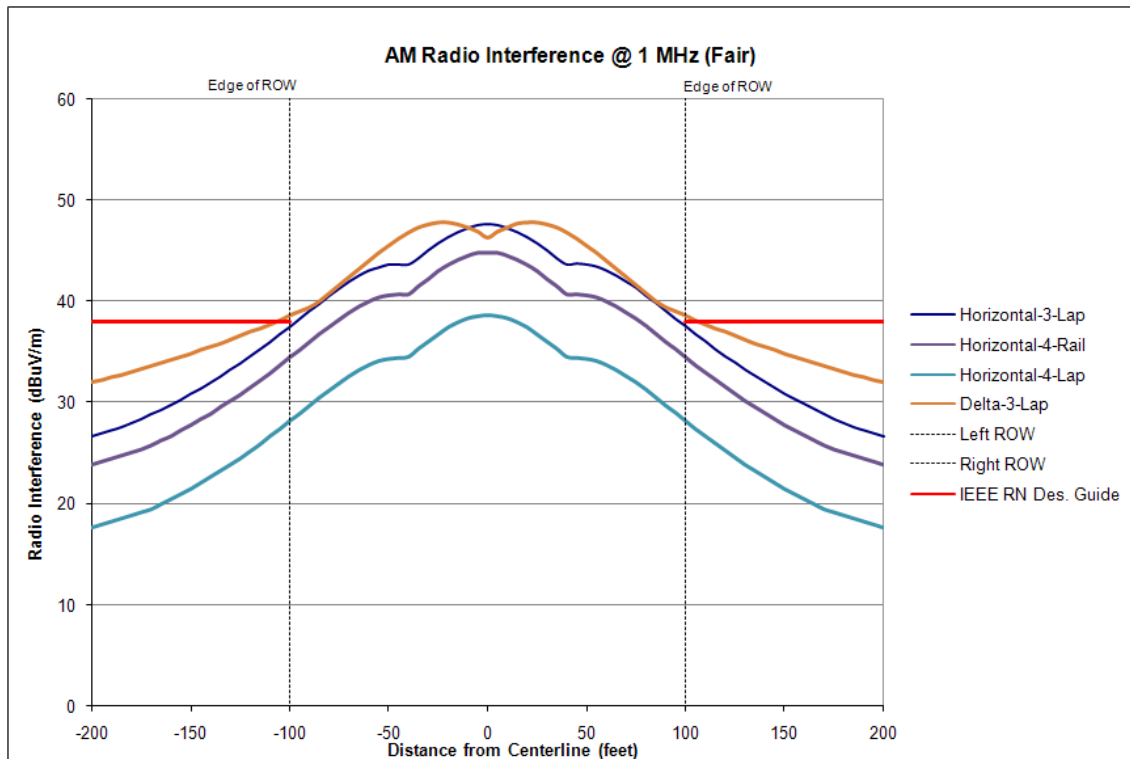


Figure 8: AM Radio Interference Across ROW for Various Configurations

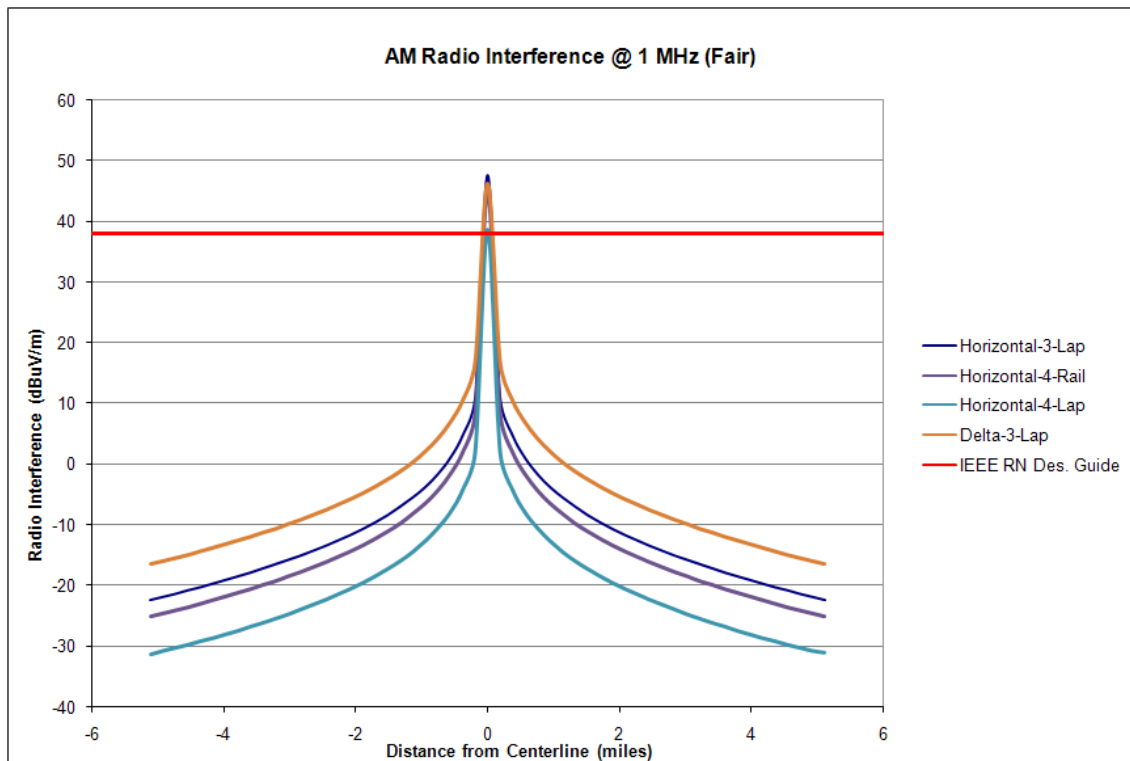


Figure 9: AM Radio Interference for Five Miles Beyond ROW for Various Configurations

4.5 Television Interference

Television interference (TVI) is the degradation of a television signal by television frequency electromagnetic disturbances and is reported as the field strength of the interference. It is often measured in decibels (dB) of one microvolt per meter ($\mu\text{V}/\text{m}$) which is a logarithmic scale. The values are reported for wet conductor conditions, as TVI is negligible during fair weather. Values are calculated at a height of ten meters above the ground per IEEE Standard 430-1986 and FCC measurement guidelines, using the average conductor height to approximate the average values along the entire line. Television signals cover multiple bands and a large range of frequencies. These calculations are made in a dead band (75 MHz) in the lower VHF band (54-88 MHz), and interference effects will decrease moving into the upper VHF (174-216 MHz) and the UHF (470-698 MHz) bands, which are the more commonly used bands.

Television interference is now less of a concern since the recent national switch to digital television. Digital television does not experience the typical TVI noise effects that analog television did, such as shadowing or snow. With digital television, there is either signal or no signal, and the signals are less susceptible to the noise due to their higher operating frequencies. However, the values are reported since there may be a few local low-strength analog stations broadcasting in the area, or for any remaining VHF digital channels on the fringe of their operating range.

There has also been no significant published research on what levels of transmission line corona TVI will cause disruption of digital television signals, therefore there are no guidelines, such as those that apply to analog television. However, the FCC has indicated that a signal-to-random noise ratio of 17 dB or greater should be sufficient for reception. Similar to radio interference, TVI needs both a signal strength and a calculated noise (interference) value to calculate a signal-to-noise ratio, which in turn would provide an idea of reception quality. Using the digital upper VHF (most stations have moved out of the lower VHF band) average signal strength for a channel of 36 dB and the signal-to-random noise ratio above, a rough limit could be approximated at 19 dB of TVI. Note that this limit is not an industry accepted limit and is only a means of rough guidance.

Table 5 shows a summary of the television interference levels in the ROW for each configuration for a single transmission line.

Table 5: Television Interference for Various Configurations [dB $\mu\text{V}/\text{m}$ @ 75 MHz]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Horizontal 3-Bundle Lapwing	18.3	30.4	24.7
Horizontal 4-Bundle Rail	15.2	27.6	21.7
Horizontal 4-Bundle Lapwing	8.9	21.4	15.4
Delta 3-Bundle Lapwing	19.4	30.5	25.7

* Average values based on data points calculated every five feet across the ROW width.

Figure 10 and Figure 11 (on the following page) respectively show a plot of the television interference levels across the ROW and extending five miles beyond the ROW for each of the configurations. The rough guideline mentioned above is indicated by a red line beyond the ROW on these plots.

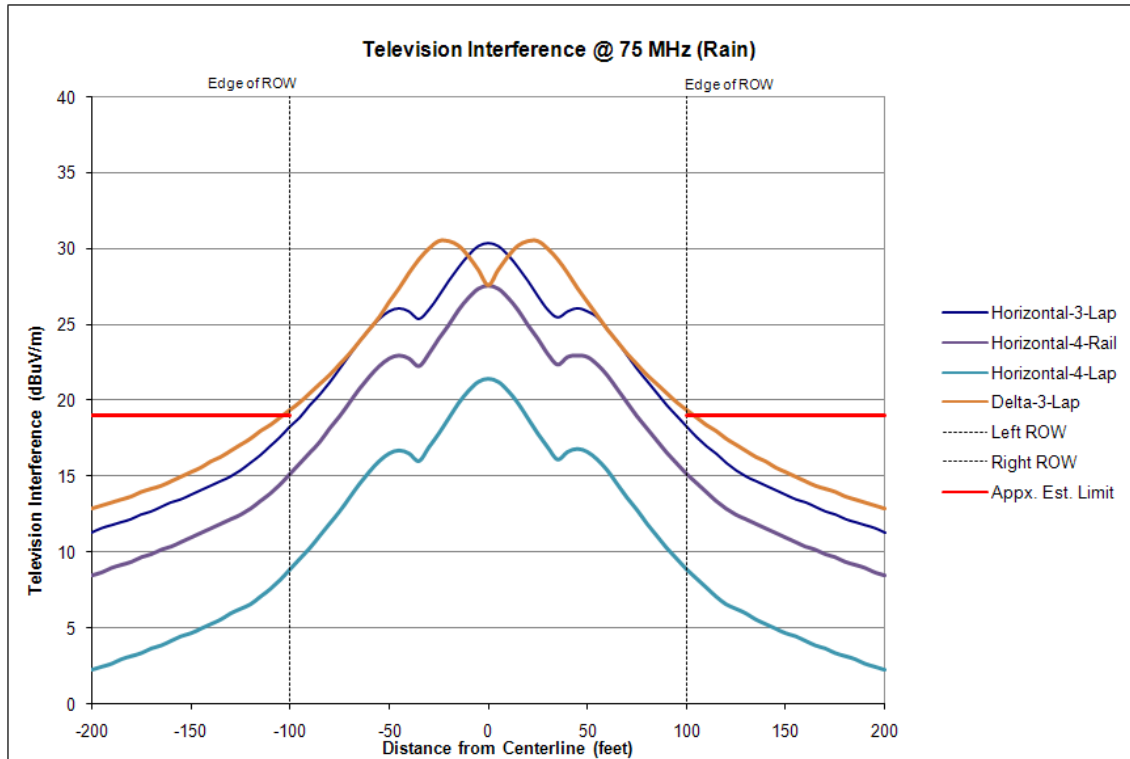


Figure 10: Television Interference Across ROW for Various Configurations

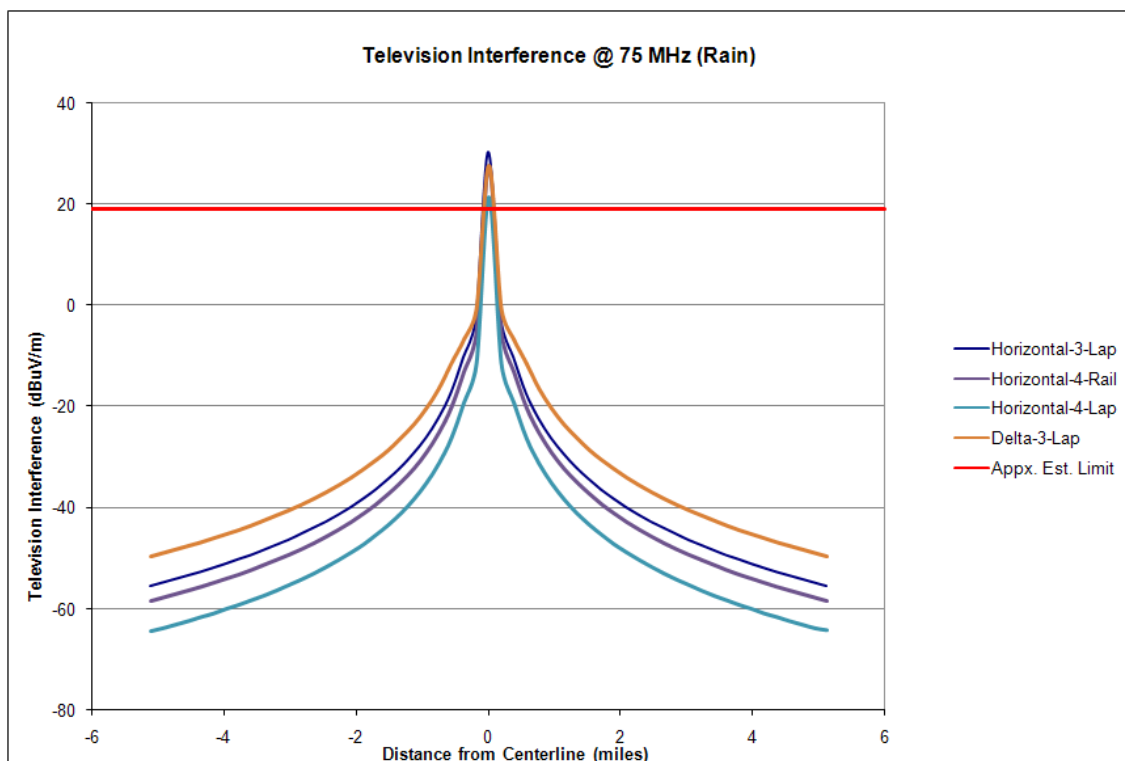


Figure 11: Television Interference for Five Miles Beyond ROW for Various Configurations

5.0 RESULTS OF INCREASING LINE VOLTAGE

This section explores the effects of increasing line voltage along the AC line. Since this transmission line will be heavily compensated with reactive power, there is a high likelihood that portions of the line will far exceed the nominal 500 kV rating. All calculations in Section 4 were based on 105% of the nominal voltage. This section extends to 110%, 115%, and 120% of nominal voltage. Increasing the voltage increases the electric field, which in turn increases the audible noise, radio interference, and television interference. Magnetic fields are driven by current and therefore are not directly affected by the system voltage.

All cases examined in this section are based on the initial design of a three conductor bundle using 1590 ACSR Lapwing conductor in a horizontal configuration. These results can be interpolated into the results of the other configurations presented in Section 4.

5.1 Electric Field

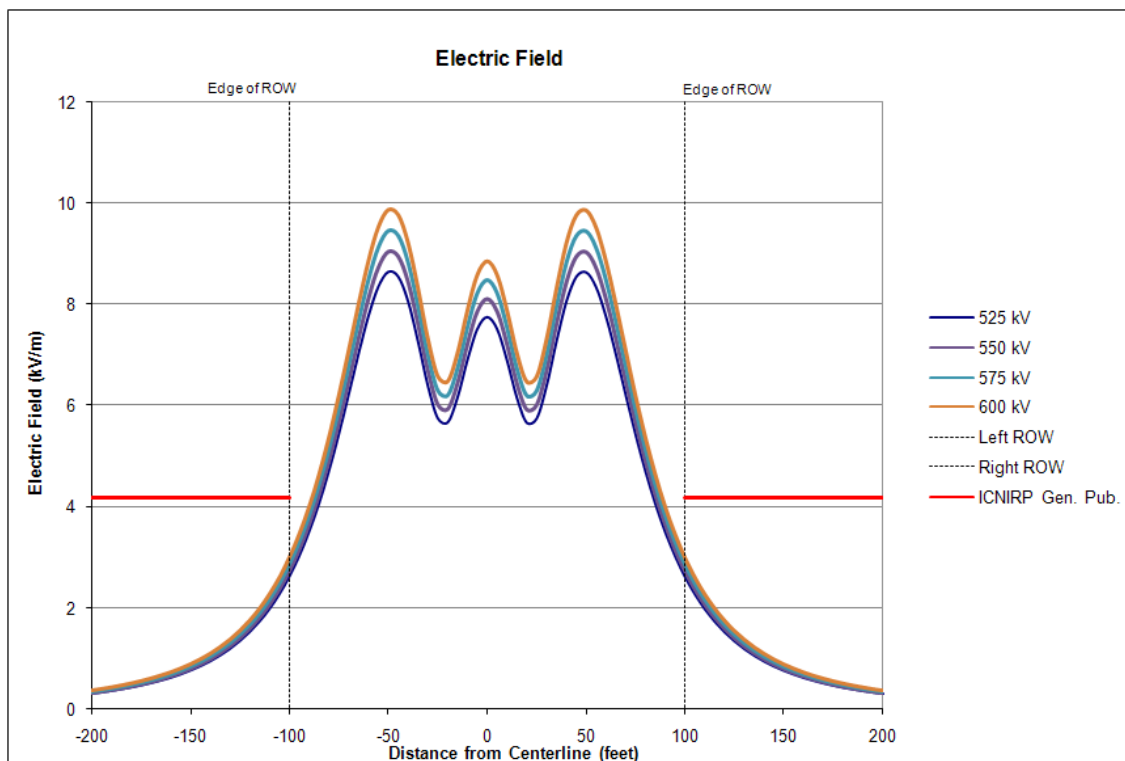
Electric fields are directly proportional to the voltage. Therefore when the voltage goes up 5%, so does the resulting electric field. Table 6 presents the increased electric fields based on the four examined scenarios.

Table 6: Electric Field Results for Different Voltages [kV/m]

CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Max. Voltage = 105% (525 kV)	2.6	8.6	6.2
Max. Voltage = 110% (550 kV)	2.7	9.0	6.5
Max. Voltage = 115% (575 kV)	2.9	9.5	6.8
Max. Voltage = 120% (600 kV)	3.0	9.9	7.1

* Average values based on data points calculated every five feet across the ROW width.

Figure 12 shows a plot of the electric field across the ROW for the various voltages. Again, none of these changes result in exceeding the ICNIRP reference level beyond the edge of the ROW, which is shown as a red line on the plot. Since the values drop to nearly the same value just beyond the edge of the ROW, no plot to five miles was provided as the fields are negligible as before.

**Figure 12: Electric Field Across ROW for Different Voltages**

5.2 Magnetic Field

The magnetic field is independent of the system voltage and therefore is not presented in this section.

5.3 Audible Noise

Table 7 shows a summary of the audible noise levels in the ROW as the voltage increases for a single transmission line. The increases in noise are roughly proportional to the increase in voltage.

Table 7: L50 Audible Noise Results for Different Voltages (Foul Weather) [dBA]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Max. Voltage = 105% (525 kV)	45.0	48.1	46.8
Max. Voltage = 110% (550 kV)	47.4	50.5	49.3
Max. Voltage = 115% (575 kV)	49.8	52.8	51.6
Max. Voltage = 120% (600 kV)	52.0	55.0	53.8

* Average values based on data points calculated every five feet across the ROW width.

Figure 13 shows a plot of the audible noise levels across the ROW for increasing voltages. The EPA recommended average noise level shown as a red line on the plot) is not exceeded within or beyond the ROW for any of these scenarios.

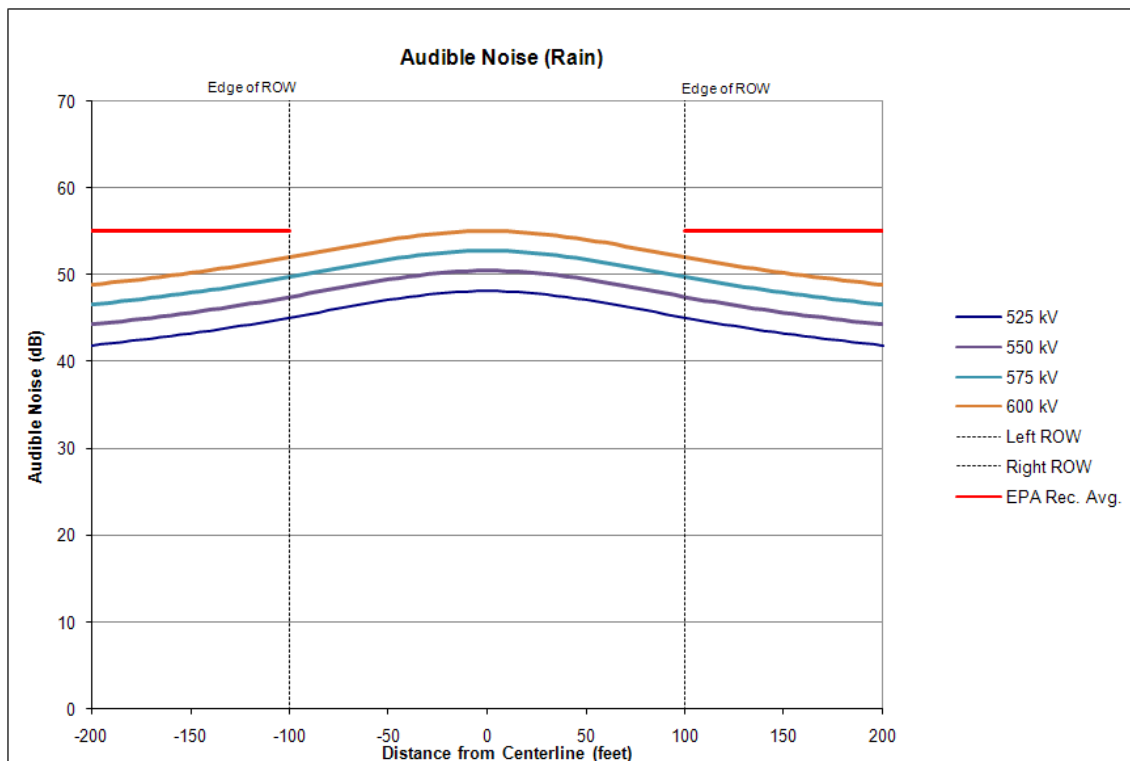


Figure 13: Audible Noise Across ROW for Different Voltages

5.4 AM Radio Interference

Table 8 shows a summary of the radio interference levels in the ROW for the increasing voltages. Again, values increase roughly proportional to the increase in voltage.

CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Max. Voltage = 105% (525 kV)	37.5	47.7	43.2
Max. Voltage = 110% (550 kV)	40.0	50.1	45.7
Max. Voltage = 115% (575 kV)	42.3	52.4	48.0
Max. Voltage = 120% (600 kV)	44.5	54.6	50.2

* Average values based on data points calculated every five feet across the ROW width.

Figure 14 shows a plot of the radio interference levels across the ROW for the various voltages. Near the higher voltages, the IEEE Radio Noise Design Guide recommended limit of 38 dB (shown as a red line) is slightly exceeded, but this is only for antennas located within about 50 feet of the edge of ROW.

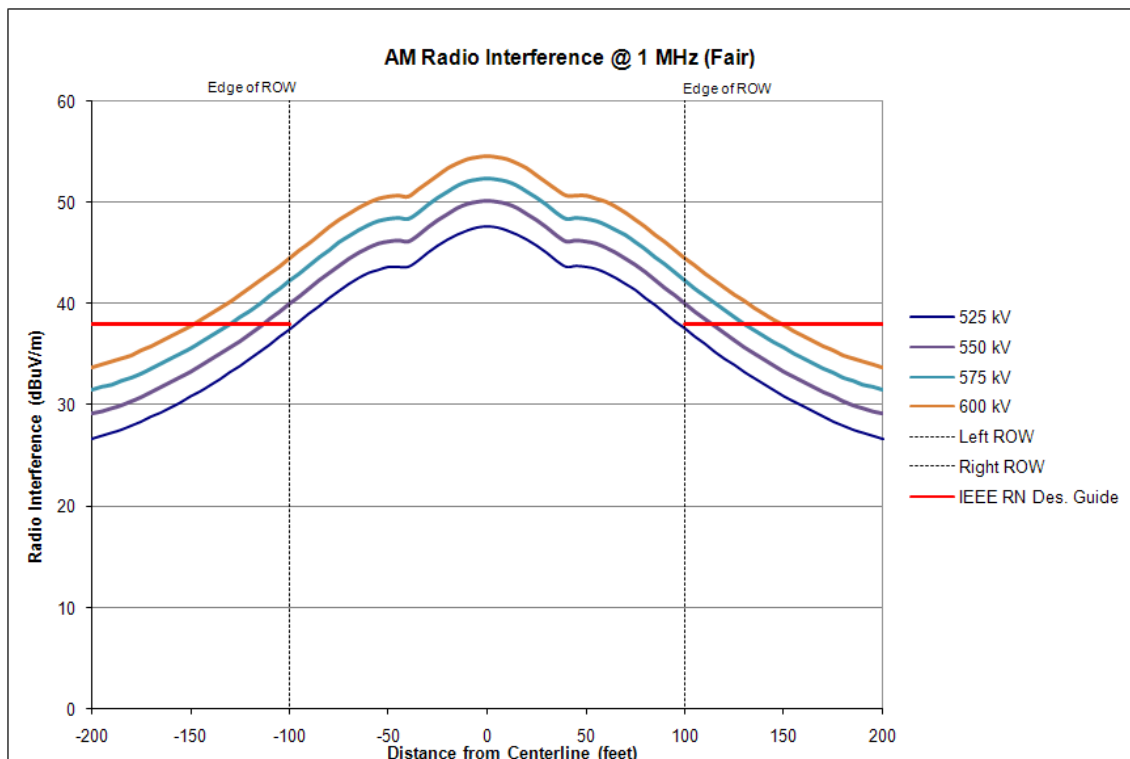


Figure 14: AM Radio Interference Across ROW for Different Voltages

5.5 Television Interference

Table 9 shows a summary of the television interference levels in the ROW for each configuration for a single transmission line. As with the other effects, TVI increases roughly proportional to the voltage.

Table 9: Television Interference for Different Voltages [dB μ V/m @ 75 MHz]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Max. Voltage = 105% (525 kV)	18.3	30.4	24.7
Max. Voltage = 110% (550 kV)	20.7	32.8	27.1
Max. Voltage = 115% (575 kV)	23.0	35.2	29.4
Max. Voltage = 120% (600 kV)	25.2	37.4	31.6

* Average values based on data points calculated every five feet across the ROW width.

Figure 15 shows a plot of the television interference levels across the ROW for each of the voltage scenarios.

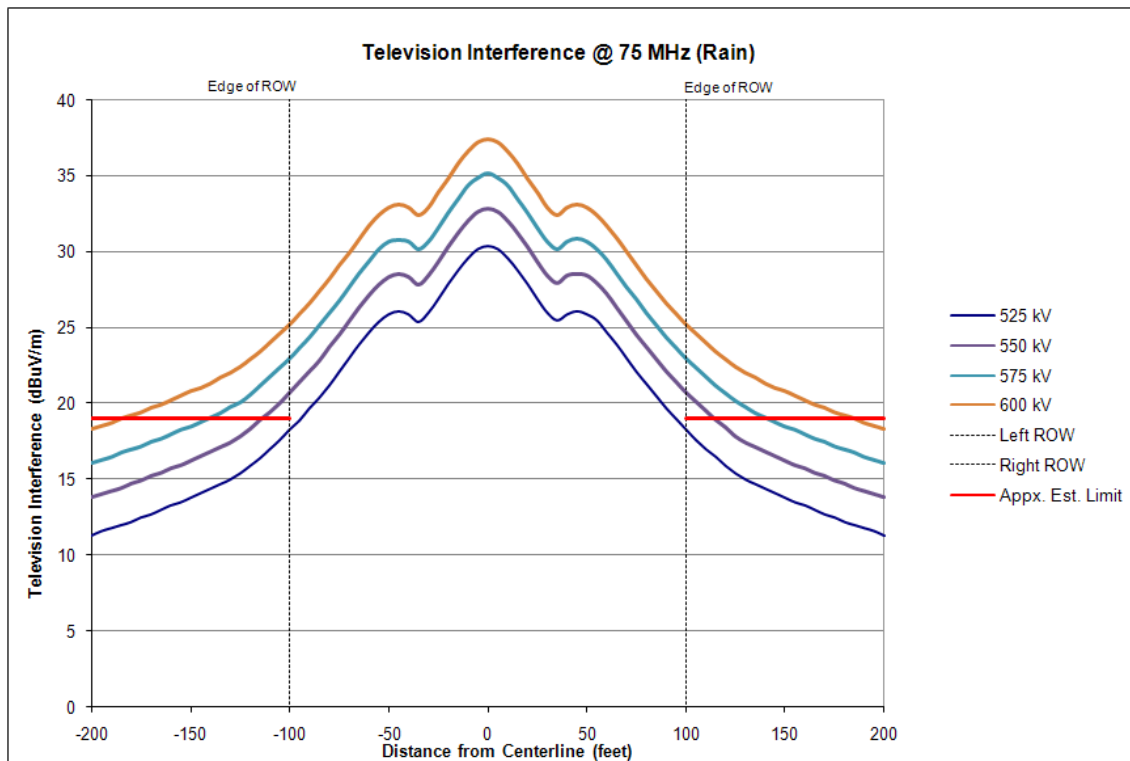


Figure 15: Television Interference Across ROW for Different Voltages

6.0 RESULTS OF ADDING A SECOND LINE

This section examines the effects of adding a second AC or DC line in parallel to the first. In addition, two phasing configurations are examined for the AC cases, the first with the phases A-B-C and A-B-C left-to-right on the two structures, the second with A-B-C and C-B-A. For some aspects one arrangement will present a slightly better configuration, and for others the opposite arrangement will be slightly better.

In general with a second AC line, values at and near the edge of ROW remain similar to that of one line, especially when examining the audible noise and radio and television interference. Values near the center of the ROW differ particularly for the electric and magnetic fields. For cases where the second line is DC, none of the values at the edge of the ROW are significantly higher. The maximum electric and magnetic fields and RI effects in the ROW are higher with DC versus AC, while the audible noise is actually lower. Once far from the line, the values are practically identical for all effects.

All cases examined in this section are based on the initial design of a three conductor bundle using 1590 ACSR Lapwing conductor in a horizontal configuration. These results can be interpolated into the results of the other AC configurations presented in Section 4.

6.1 Electric Field

Table 10 shows a summary of the values in the ROW for different configurations with two transmission lines in the corridor. These values are similar to the single line cases, although the DC values peak higher in the ROW.

Table 10: Electric Field Results for Two Circuits [kV/m]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Second Line with A-B-C and A-B-C Phasing (L to R)	2.7	8.7	4.7
Second Line with A-B-C and C-B-A Phasing (L to R)	2.6	9.1	5.3
AC-DC Hybrid	2.6	12.0	6.8

* Average values based on data points calculated every ten feet across the ROW width.

Figure 16 shows a plot of the electric field across the ROW for the configurations. Due to the arrangement of the phase conductors, the A-B-C A-B-C configuration presents a cancelation effect, reducing the electric maximum field strength near the center of the ROW. The DC line brings up the field strength on its side of the corridor due to larger phase-to-neutral voltages associated with it. Ion enhanced fields were not considered in the electric field strength of the hybrid line. This is a phenomenon where static pole conductors can actually charge the air particles in the immediate vicinity in fair low wind conditions and could cause field strengths higher than reported. These enhanced fields vary significantly

with weather conditions, and are hard to predict. Other reported values do take these effects into account due to the use of empirical formulas.

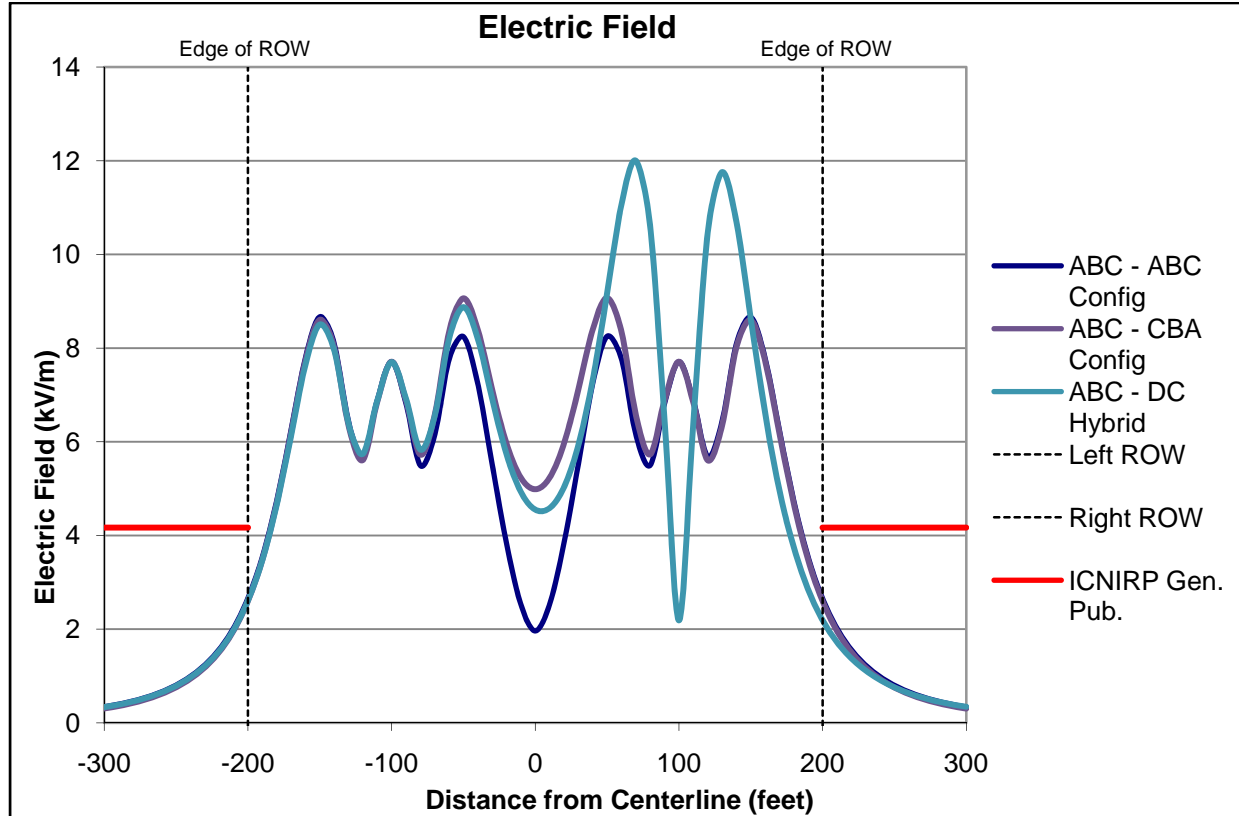


Figure 16: Electric Field Across ROW for Two Circuits

6.2 Magnetic Field

Table 11 shows a summary of the values in the ROW for the different configurations with two transmission lines in the corridor assuming maximum current loading. Again, the results are directly proportional to the loading of the line; therefore, 50% loading would be exactly half of the 100% loading condition. The values presented are similar to a single line case at the edge of ROW.

Table 11: Magnetic Field Results for Two Circuits – 100% Loading [mG]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Second Line with A-B-C and A-B-C Phasing (L to R)	97.4	284.9	171.4
Second Line with A-B-C and C-B-A Phasing (L to R)	82.1	323.2	188.0
AC – DC Hybrid	102.5	496.6	272.8

* Average values are based on data points calculated every ten feet across the ROW width.

Figure 17 shows a plot of the magnetic field across the ROW at 100% loading for the various configurations. Similar to the electric field, the A-B-C A-B-C configuration presents a cancellation effect near the center of the ROW, although the values near the edge of the ROW and beyond are actually lower with the A-B-C C-B-A configuration. However, the AC – DC hybrid corridor has much higher peak magnetic fields in the ROW due to the fact that the DC has approximately twice the current of the AC line.

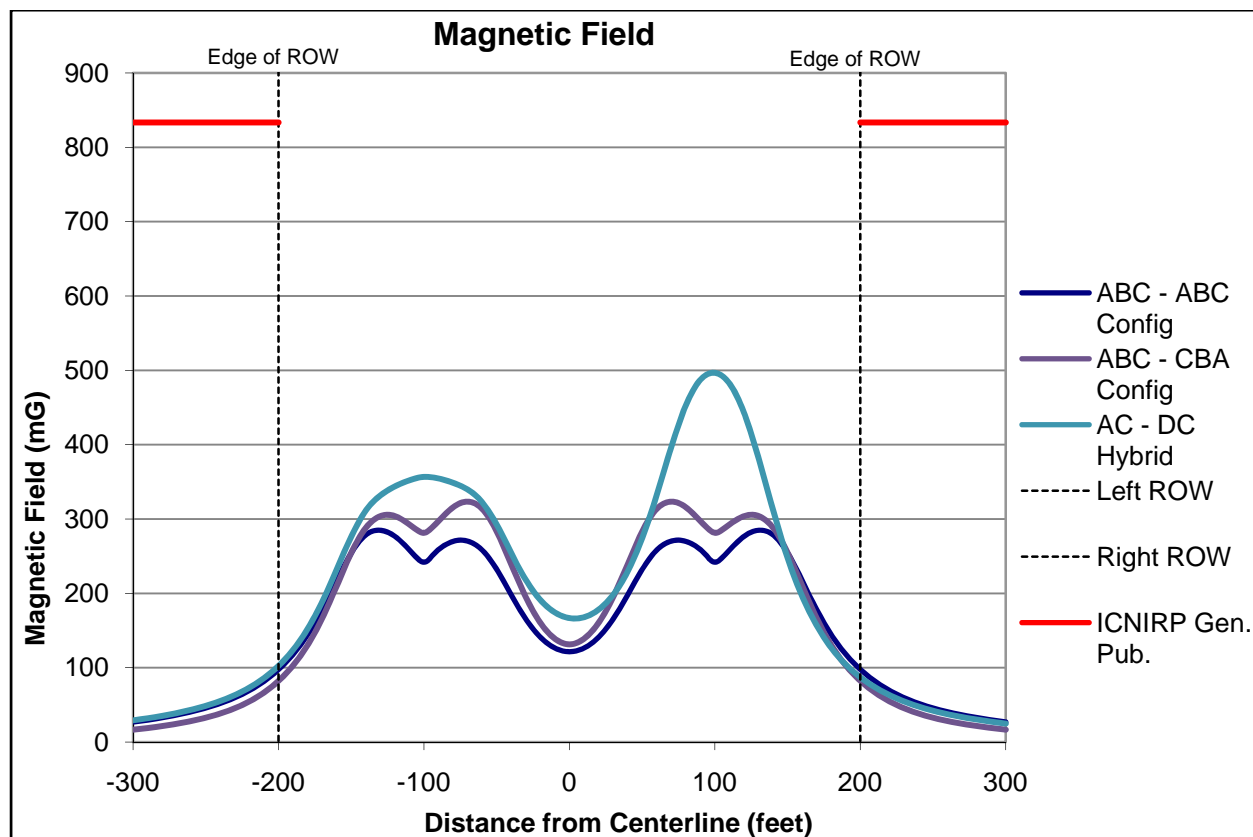


Figure 17: Magnetic Field Across ROW for Two Circuits

6.3 Audible Noise

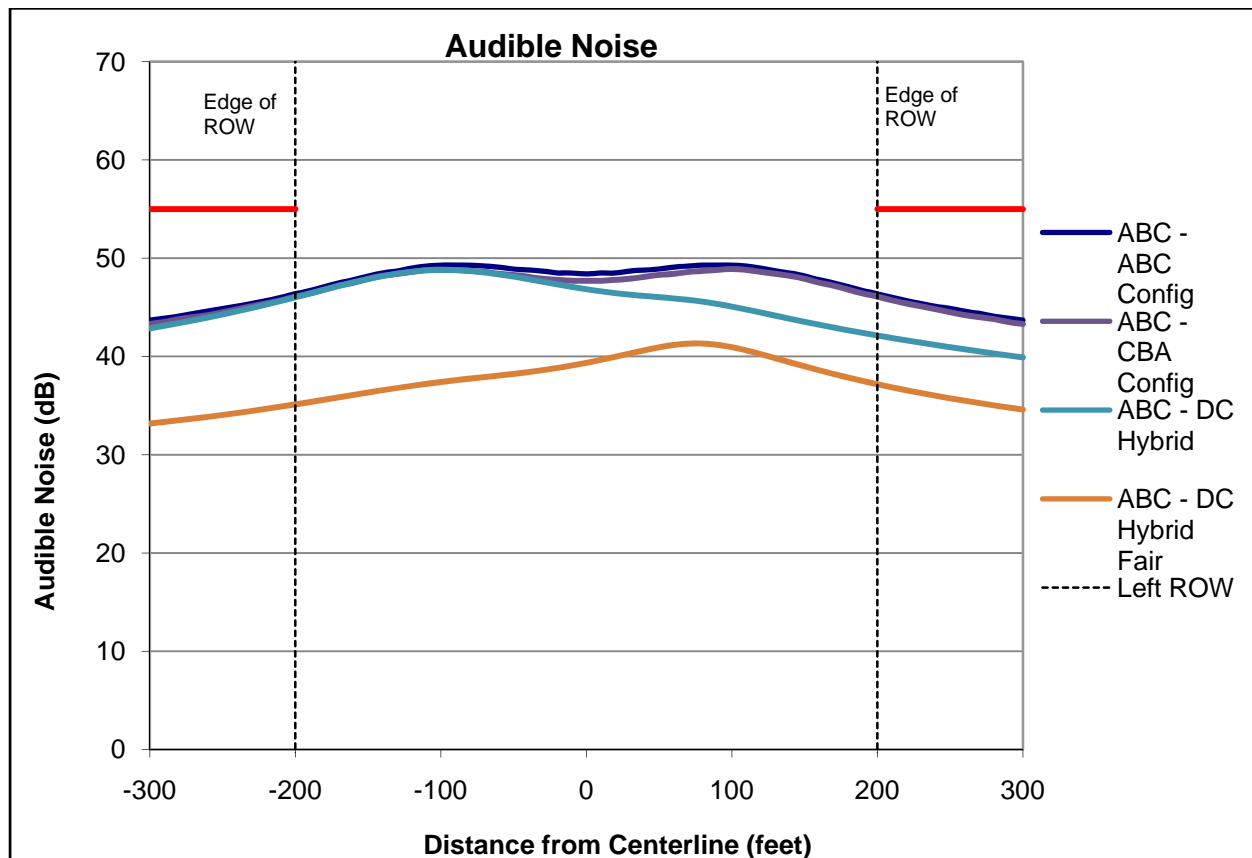
Table 12 shows a summary of the values in the ROW for the different line configurations with two transmission lines in the corridor. These values are approximately equal to those of a single line for foul weather conditions.

Table 12: L50 Audible Noise Results for Two Circuits (Foul Weather for AC) [dBA]

CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Second Line with A-B-C and A-B-C Phasing (L to R)	46.4	49.3	47.7
Second Line with A-B-C and C-B-A Phasing (L to R)	46.1	48.9	47.2
AC-DC Hybrid (Foul)	46.0	48.8	46.3
AC-DC Hybrid (Fair)	37.2	41.3	38.5

* Average values based on data points calculated every ten feet across the ROW width.

Figure 18 shows a plot of the audible noise levels across the ROW for the various configurations. There is negligible difference between the configurations in areas of close proximity to the AC transmission lines. The DC transmission line is actually noisier during fair weather which is why it is included. However, the noise from the foul weather AC transmission line is greater than that of the fair weather DC line for both weather conditions and all values are below the EPA guidelines.

**Figure 18: Audible Noise Across ROW for Two Circuits**

6.4 AM Radio Interference

Table 13 shows a summary of the values in the ROW with two transmission lines in the corridor. These values are nearly identical to the single transmission line case at the edge of ROW.

Table 13: L50 Radio Interference for Two Circuits (Fair Weather) [dB μ V/m @ 1MHz]			
CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Second Line with A-B-C and A-B-C Phasing (L to R)	37.3	47.8	40.6
Second Line with A-B-C and C-B-A Phasing (L to R)	37.6	47.8	40.0
AC-DC Hybrid	38.1	50.0	41.6

* Average values based on data points calculated every ten feet across the ROW width.

Figure 19 shows a plot of the radio interference levels across the ROW for the various configurations. The values of the under the DC line increase slightly, but there is little change outside of the ROW.

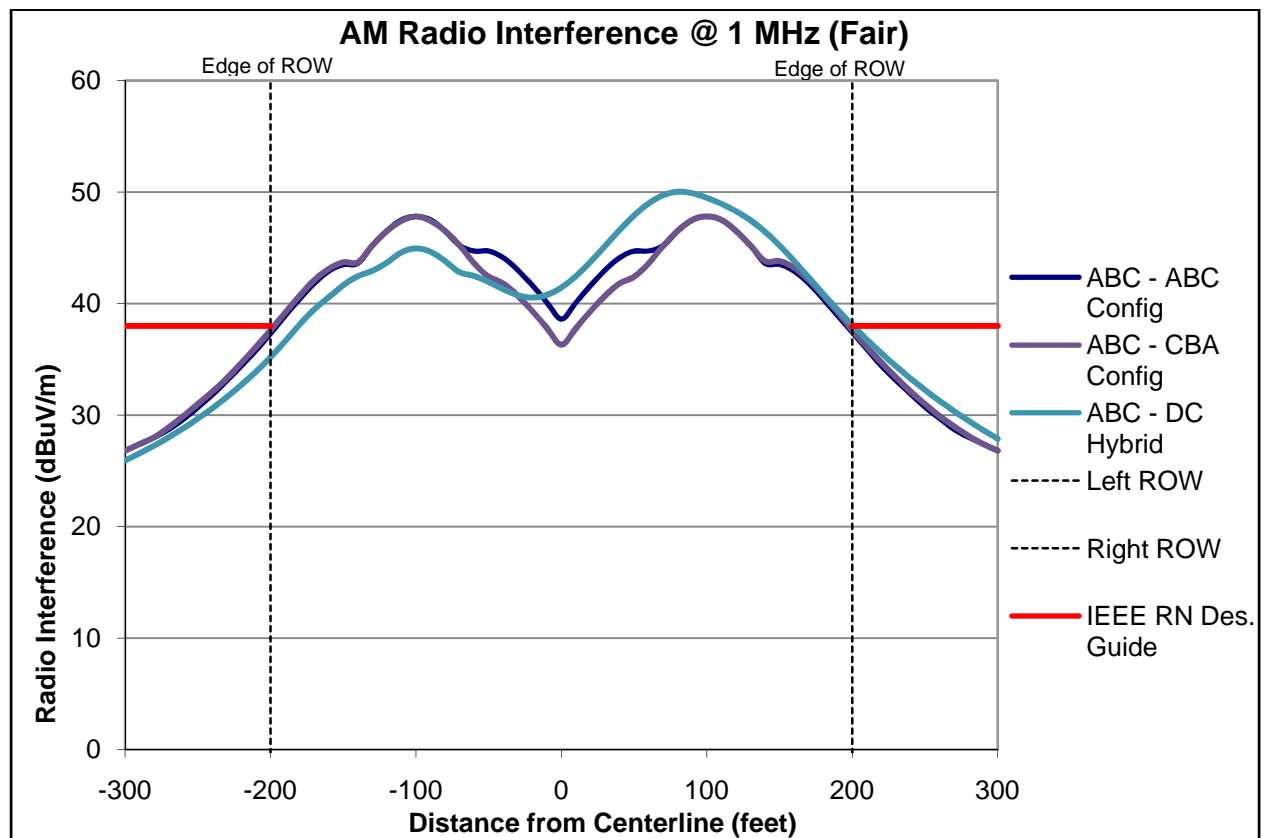


Figure 19: AM Radio Interference Across ROW for Two Circuits

6.5 Television Interference

Table 14 shows a summary of the television interference values in the ROW for the two different AC line phasing configurations with two transmission lines in the corridor. These values are nearly identical to those of a single transmission line. The Enviro software does not produce radio frequency interference results in the television band as it only goes up to 30 MHz. The DC line is not expected to produce significant interference in this frequency range. One quote from the EPRI *Transmission Line Reference Book HVDC to +/- 600 kV*, is “No significant TVI has ever been measured from DC lines during fair or foul weather; therefore, no attempt has been made to develop equations for calculating TVI from DC Lines.”

Table 14: Television Interference for Two Circuits [dBuV/m @ 75 MHz]

CASE	EDGE OF ROW	MAXIMUM IN ROW	AVERAGE IN ROW*
Second Line with A-B-C and A-B-C Phasing (L to R)	18.1	30.5	22.4
Second Line with A-B-C and C-B-A Phasing (L to R)	18.3	30.5	21.8

* Average values based on data points calculated every ten feet across the ROW width.

Figure 20 shows a plot of the television interference levels across the ROW for the two configurations. Similar to radio interference, there is negligible difference between the two options outside of the ROW.

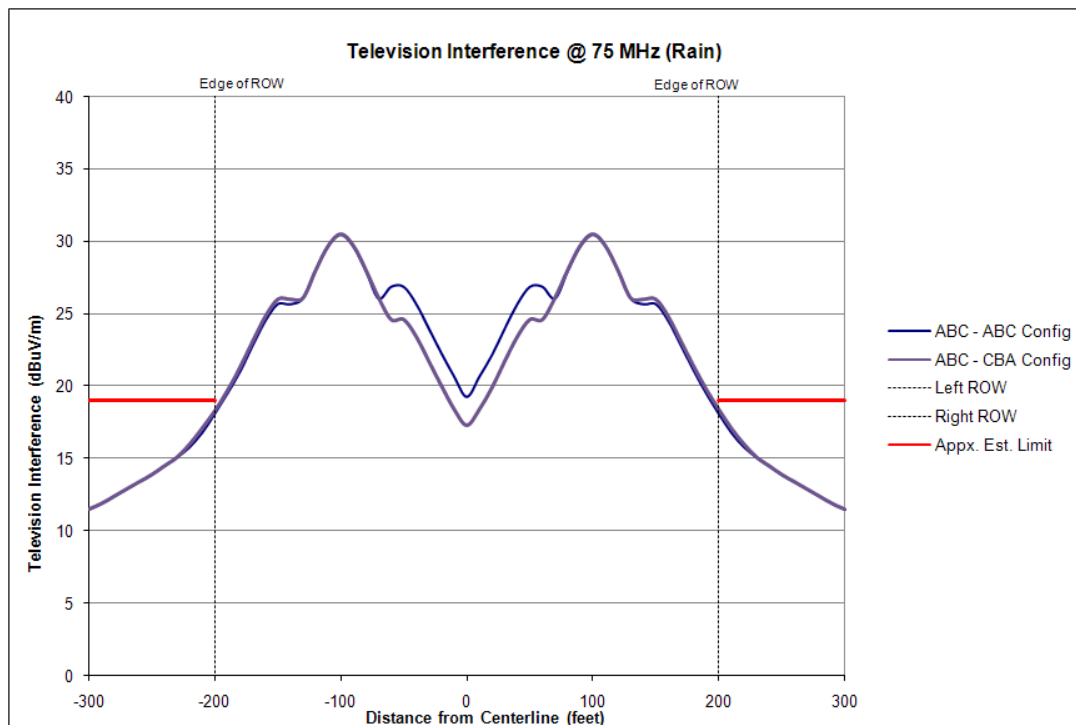


Figure 20: Television Interference Across ROW for Two Circuits

7.0 GENERAL SUMMARY OF RESULTS

This report analyzed EMF and field effects for a base case horizontal guyed V structure with a three conductor bundle, and explored the effects of modifying the bundle or structure type, increases in voltage along the line, and the addition of a second AC or DC line in parallel. In general, it appears that the base case structure and bundle configuration will be acceptable based on the discussion and results in the previous sections. Adding a future second AC or DC line will produce similar results outside of the ROW as compared to a single line.

No guidance was provided on limits that could not be exceeded for any of the field effects. These limits are typically presented by state or municipal requirements; however, Arizona and New Mexico do not have any statewide requirements. All electric and magnetic fields calculated are below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) reference exposure limits for both general public exposure off the ROW. Audible noise levels are below EPA recommended values for outdoor areas. Radio and television interference depend on the signal strength to categorize the effects of the interference on reception quality. Values for AM radio interference are approximately at or below typical guidelines and television interference has no published guidelines for digital television signals, although the interference produced by the lines is likely acceptable. Any additional radio frequency concerns were not presented at this time for other communications systems in the areas.

APPENDIX A – TRANSMISSION LINE STRUCTURE DRAWINGS

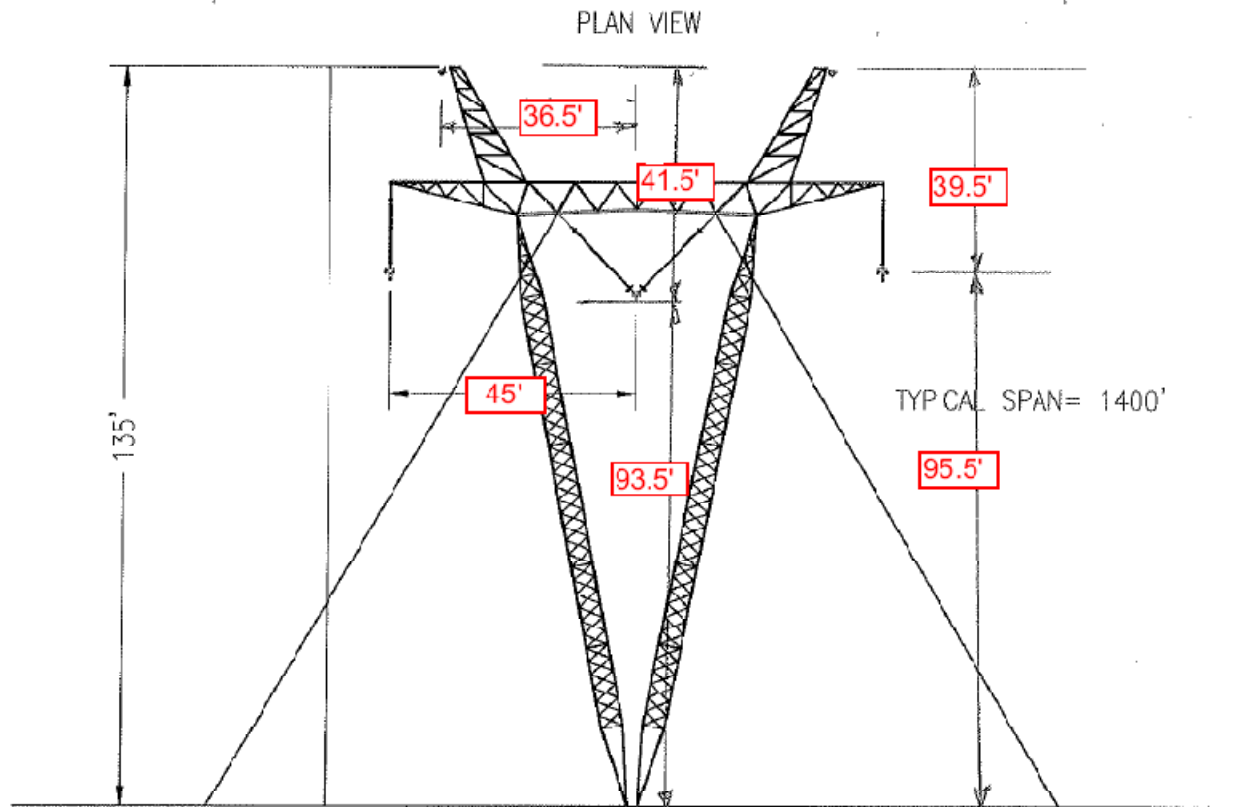


FIG. 1
LATTICE GUYED-V

Figure 21: Horizontal Transmission Structure Configuration

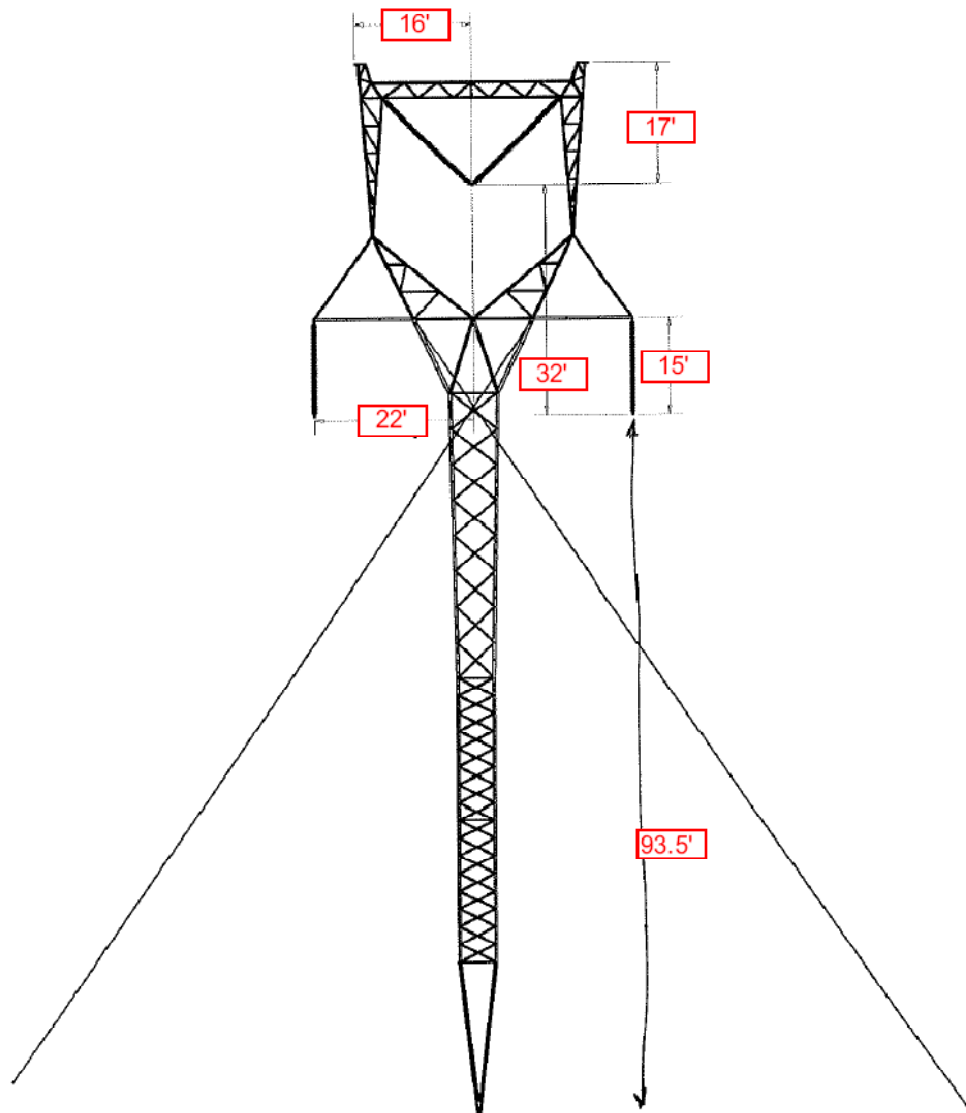


Figure 22: Delta Transmission Structure Configuration

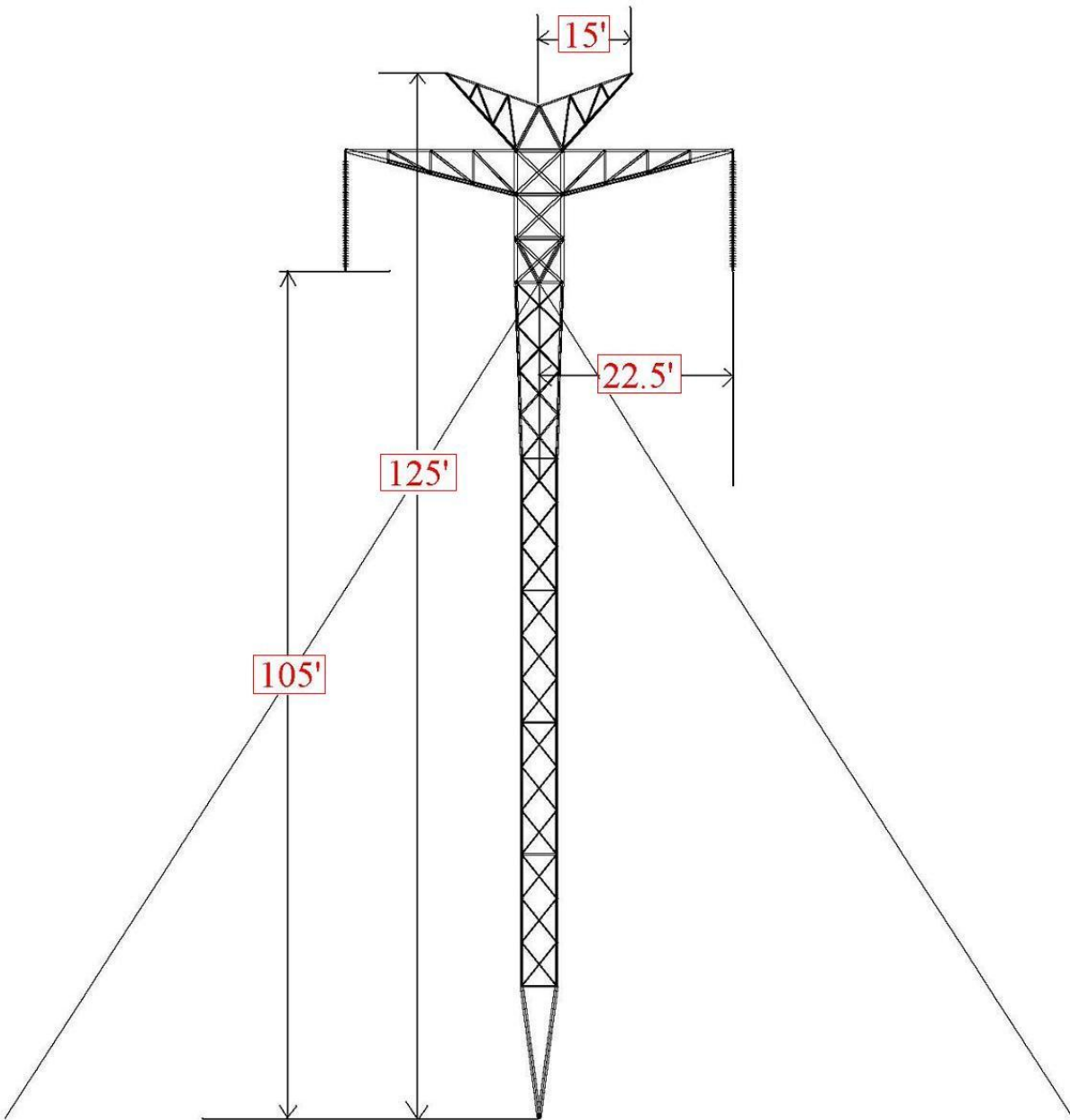


Figure 23: DC Tower Configuration

APPENDIX L – NATIONAL SCENIC AND HISTORIC TRAILS

TABLE OF CONTENTS

1.1	Introduction	L-1
1.2	Regulatory Framework	L-1
1.3	Issues Identified for Analysis	L-4
1.3.1	National Historic Trails	L-4
1.3.2	National Scenic Trails	L-5
1.3.3	Trails Recommended as Suitable for National Trail Designation....	L-6
1.4	Study Methodology	L-7
1.4.1	Introduction	L-7
1.4.2	Inventory (Affected Environment)	L-8
1.4.3	Impact Assessment Methodology	L-13
1.5	Regional Setting	L-17
1.5.1	National Historic Trails	L-17
1.5.2	National Scenic Trails	L-18
1.5.3	Butterfield Overland Mail and Stage Route	L-19
1.6	Inventory Results.....	L-20
1.6.1	National Historic Trails	L-20
1.6.2	National Scenic Trails	L-27
1.6.3	Trails Recommended as Suitable for National Trail Designation..	L-34
1.7	Impact Analysis Results	L-38
1.7.1	Route Group 1: SunZia East Substation to Midpoint Substation...	L-38
1.7.2	Route Group 3: Midpoint Substation to Willow-500 kV Substation	L-45
1.7.3	Route Group 4: Willow 500 kV Substation to Pinal Central Substation	L-51
1.7.4	Cumulative Effects	L-62

LIST OF TABLES

Table L-1.	Assessing Intensity of Impacts.....	L-14
Table L-2.	Summary of Trail-related Cultural Resource Sites for El Camino Real de Tierra Adentro NHT	L-40
Table L-3.	Summary of Trail-related Cultural Resource Sites for Butterfield Trail	L-43
Table L-4.	Summary of Trail-related Cultural Resource Sites for Juan Bautista de Anza NHT	L-52

LIST OF FIGURES

Figure L-1.	Panel index map illustrating the locations for the Project-level NTS assessment.....	L-69
Figure L-2.	Detailed trail inventory for visual and recreation resources (Panel 1).....	L-71
Figure L-3.	Detailed trail inventory for visual and recreation resources (Panel 2).....	L-73
Figure L-4.	Detailed trail inventory for visual and recreation resources (Panel 3).....	L-75
Figure L-5.	Detailed trail inventory for visual and recreation resources (Panel 4).....	L-77
Figure L-6.	Detailed trail inventory for visual and recreation resources (Panel 5).....	L-79
Figure L-7.	Detailed trail inventory for visual and recreation resources (Panel 6).....	L-81
Figure L-8.	Detailed trail inventory for visual and recreation resources (Panel 7).....	L-83
Figure L-9.	Detailed trail inventory for visual and recreation resources (Panel 8).....	L-85
Figure L-10.	Detailed trail inventory for visual and recreation resources (Panel 9).....	L-87
Figure L-11.	Detailed trail inventory for visual and recreation resources (Panel 10).....	L-89
Figure L-12.	Detailed trail inventory for visual and recreation resources (Panel 11).....	L-91
Figure L-13.	Detailed trail inventory for visual and recreation resources (Panel 12).....	L-93
Figure L-14.	Detailed trail inventory for visual and recreation resources (Panel 13).....	L-95
Figure L-15.	Detailed trail inventory for visual and recreation resources (Panel 14).....	L-97
Figure L-16.	Detailed trail inventory for visual and recreation resources (Panel 15).....	L-99
Figure L-17.	Detailed trail inventory for visual and recreation resources (Panel 16).....	L-101
Figure L-18.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 1).....	L-103
Figure L-19.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 2).....	L-105
Figure L-20.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 3).....	L-107
Figure L-21.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 4).....	L-109
Figure L-22.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 5).....	L-111
Figure L-23.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 6).....	L-113
Figure L-24.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 7).....	L-115
Figure L-25.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 8).....	L-117
Figure L-26.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 9).....	L-119
Figure L-27.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 10).....	L-121
Figure L-28.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 11).....	L-123
Figure L-29.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 12).....	L-125

LIST OF FIGURES

Figure L-30.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 13).....	L-127
Figure L-31.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 14).....	L-129
Figure L-32.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 15).....	L-131
Figure L-33.	Detailed trail inventory for cultural, biological, and other natural resources (Panel 16).....	L-133
Figure L-34.	Composite impact assessment results (Panel 1).....	L-135
Figure L-35.	Composite impact assessment results (Panel 2).....	L-137
Figure L-36.	Composite impact assessment results (Panel 3).....	L-139
Figure L-37.	Composite impact assessment results (Panel 4).....	L-141
Figure L-38.	Composite impact assessment results (Panel 5).....	L-143
Figure L-39.	Composite impact assessment results (Panel 6).....	L-145
Figure L-40.	Composite impact assessment results (Panel 7).....	L-147
Figure L-41.	Composite impact assessment results (Panel 8).....	L-149
Figure L-42.	Composite impact assessment results (Panel 9).....	L-151
Figure L-43.	Composite impact assessment results (Panel 10).....	L-153
Figure L-44.	Composite impact assessment results (Panel 11).....	L-155
Figure L-45.	Composite impact assessment results (Panel 12).....	L-157
Figure L-46.	Composite impact assessment results (Panel 13).....	L-159
Figure L-47.	Composite impact assessment results (Panel 14).....	L-161
Figure L-48.	Composite impact assessment results (Panel 15).....	L-163
Figure L-49.	Composite impact assessment results (Panel 16).....	L-165

This page intentionally left blank.

1.1 INTRODUCTION

National Scenic Trails (NST) and National Historic Trails (NHT) are part of the National Trails System (NTS), which is a network of scenic, historic, and recreation trails created by the National Trails System Act of 1968 [16 USC 1241-1251]. NSTs and NHTs are authorized and designated only by Act of Congress. NSTs are continuous trails more than 100 miles long, which provide nonmotorized routes with outstanding recreational opportunities. NHTs commemorate historic routes of exploration, migration, trade, communication, and military action (NPS 2012d), and must meet three criteria: (1) follow as closely as possible the actual route of historic use; (2) be of national significance; and (3) have significant potential for public recreation and/interpretation opportunities [16 USC 1242].

NSTs and NHTs are formally administered by various federal agencies; however, land ownership may be public or private. To adhere to new BLM guidance for National Trails (see Section 1.2 for policy framework), this appendix focuses on the inventory and impact assessment of (1) congressionally designated National Trails, (2) trails undergoing National Trail Feasibility Study (trails under study) and, (3) trails that are deemed suitable for designation per BLM manuals 6250, 6280, and 8353. It should be noted that all National Trails were inventoried and reviewed based on National Environmental Policy Act (NEPA) requirements (i.e., equal level of analysis regardless of jurisdiction); however, the trails were evaluated in context with BLM methodology. National trails were also evaluated in terms of individual resources, including biological, cultural, visual, and land use (see chapters 3 and 4 of the Final EIS).

1.2 REGULATORY FRAMEWORK

Federal agencies must consider the effects of their actions on NSTs and NHTs under the NEPA and the National Trails System Act of 1968 [16 USC 1246]. The law states that other uses along an NST or NHT that would not substantially interfere with the nature and purpose of the trail may be permitted by the Secretary charged with the administration of the trail. Reasonable efforts shall be made to provide sufficient access opportunities to such trails and, to the extent practicable, efforts shall be made to avoid activities incompatible with the purposes for which such trails were established [16 USC 1246]. More specifically, the Secretary of the Interior or the Secretary of Agriculture as the case may be, may grant easements and rights-of-way upon, over, under, across, or along any component of the national trails system in accordance with the laws applicable to the national park system and the national forest system, respectively, provided that any conditions contained in such easements and rights-of-way shall be related to the policy and purposes of the National Trails System Act [16 USC 1248].

A designation as either an NST or NHT requires a two-step process: (1) Congressional authorization of a feasibility study, and (2) Congressional designation. While a trail is undergoing a National Trail Feasibility Study, or when a trail has been recommended as suitable for designation and Congress has not yet acted to designate the trail, the Bureau of Land Management (BLM) shall manage the values, characteristics, and settings of the trail in accordance with the Federal Land Policy Management Act of 1976, as amended (FLPMA). Following congressional designation, the development of a trail comprehensive management plan (CMP) is required, which is used by various agencies in the development of land use

planning documents (e.g., BLM Field Office resource management plans [RMP] and U.S. Forest Service [USFS] land and resource management plans).

BLM implementation of the requirements established by the National Trails System Act can be found in the agency's National Trails System manual series—BLM manuals 6250, 6280, and 8353 (BLM 2012a, b, c). These manuals provide administrative and management guidance.

- National Trails System Act of 1968
- *BLM Manual 6250 – National Scenic and Historic Trails Administration (Public)* addresses specific functions delegated to the BLM from the Secretary of the Interior pursuant to the National Trails System Act. Specifically, this manual describes how to conduct National Scenic or Historic Trail Feasibility Studies, how to administer a National Scenic or Historic Trail upon designation by Congress, and the responsibilities of National Scenic or Historic Trail administrators. This manual also identifies data and records management requirements.
- *BLM Manual 6280 – Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (Public)* provides policies for the management of National Scenic and Historic Trails. Specifically, this manual identifies requirements for the management of trails undergoing National Trail Feasibility Study; trails that are recommended as suitable for National Trail designation through the National Trail Feasibility Study; inventory, planning, management, and monitoring of designated National Scenic and Historic Trails; and data and records management requirements for National Scenic and Historic Trails.
- *BLM Manual 8353 – Trail Management Areas – Secretarially Designated National Recreation, Water, and Connecting and Side Trails (Public)* addresses secretarially designated National Recreation Trails (including the National Water Trails) and Connecting and Side Trails, including requirements for cooperative relationships; trail marking; identifying, evaluating, and recommending trails; nominating trails through the submission of application packages; and data and records management.

For the purposes of NEPA and the project-level analysis addressed in this EIS, BLM Manual 6280 served as the primary regulatory guidance (BLM 2012b). This manual describes the steps that are required to identify and manage NST and NHT resources within the broader regulatory framework governing BLM-administered lands. More specifically, BLM Manual 6280 provides policy direction regarding the BLM's management approach and the NEPA analysis requirements for congressionally designated trails and trails undergoing feasibility studies, and trails deemed suitable for designation.

As part of the NEPA analysis, for any implementation-level action proposed or that may potentially affect NSTs, NHTs, or trails under feasibility study, the BLM shall:

- (i) For each alternative, describe and analyze the potential impacts to the nature and purposes of the National Trail, and the National Trail resources, qualities, values, and associated settings and the primary use or uses of the trail.

(ii) Describe the impacts to the national significance of National Trails, based on NHPA National Historic Landmark criteria and other NTSA criteria, as well as impacts to the significance of properties that are eligible or listed on the National Register, as applicable.

(iii) Ensure adequate public involvement in the BLM's management activities through the NEPA, land use planning, and/or other applicable processes.

(iv) Coordinate with the National Trail administering agency during the environmental review and land use planning processes regarding the establishment of the National Trail Management Corridor. It should be noted that no National Trail Management Corridors were established for the Project in context with this appendix. However, study corridors were developed to inventory and assess impacts to National Trails in terms of resource, values, qualities, and associated settings. The study corridor was established in consultation with the Trails "Stakeholder Group," which consisted of agency trail administrators, agency resource specialists, and public trail groups.

(v) To the greatest extent possible, consider opportunities for mitigation to a level commensurate with the adverse impact to the nature and purposes; resources, qualities, values, and associated settings; and the primary use or uses of the National Trail.

(vi) Include the following in the Decision Record or Record of Decision:

(a) Whether the proposed action will substantially interfere or will be incompatible with the nature and purposes of the National Trail, including the resources, qualities, values, or associated settings, or the primary use or uses.

(b) A description of the action taken to authorize or deny an activity or the application of any best management practices or mitigation measures (BLM 2012b:1-22-1-23).

For trails under feasibility study, the NEPA analysis for the proposed action will consider existing data, including data from the completed National Trail Feasibility Study (if available), data provided to the BLM by the agency conducting the National Trail Feasibility Study, or additional data collected as necessary for alternative formulation and analysis of the proposed action (i.e., SunZia Southwest Transmission Project). In evaluating whether to approve the proposed action, the NEPA analysis will:

(i) Describe the values, characteristics, and settings of trails under study and trails recommended as suitable in the affected environment section of the NEPA document.

(ii) Analyze and describe any impacts of the proposed action on the values, characteristics, and settings of trails under study or trails recommended as suitable.

(iii) Consider an alternative that would avoid adverse impacts to the values, characteristics, and settings of the trail under study or recommended as suitable and/or incorporate and consider applying design features to avoid adverse impacts.

(iv) When the proposed action is anticipated to have a significant adverse impact, there must be coordination between the BLM State Office and the assigned National Trail Feasibility Study agency office. If the anticipated significant adverse impact cannot be avoided, the BLM State Office must contact the BLM Washington Office so that coordination with the study agency headquarters office can be initiated (BLM 2012:2-3-2-4).

Other federal legislation or regulation applicable to NSTs and NHTs in the Project area includes:

- *Federal Land Policy and Management Act of 1976, as amended* (43 USC 1701; PL 94-579) The FLPMA consolidates and articulates BLM and USFS management responsibilities and governs most uses of federal lands, including authorization to grant or renew rights-of-way. In accordance with the FLPMA, the BLM and USFS must make land use decisions based on principles of multiple use and sustained yield. As such, a grant of right-of-way must be limited to its necessary use and must contain terms and conditions that reflect the agencies' management responsibilities under the FLPMA, including minimizing impacts on fish and wildlife habitat.
- *National Landscape Conservation System* (16 USC 7201-7203) was established in 2000 by a Department of Interior Secretarial Order, "in order to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations." The National Landscape Conservation System was made permanent and codified in the Omnibus Public Land Management Act of 2009 (PL 111-11, Title II). The system includes the following areas administered by the BLM: National Monuments, National Conservation Areas, Wilderness, Wilderness Areas, Wild and Scenic Rivers, National Scenic and Historic Trails, Cooperative Management and Protection Areas, Outstanding Natural Areas, and Forest Reserves.
- *The National Historic Preservation Act of 1966, as amended* (16 USC 470; 36 CFR 800) directs federal agencies to take into account the effects of their actions on historic properties and provide the Advisory Council on Historic Preservation a reasonable opportunity to comment.
- *BLM Manual 8400 – Visual Resource Management* outlines the system used by the BLM to manage visual resources on BLM-administered lands, and includes an inventory of existing scenic values as well as management objectives that define the allowable levels of disturbance or visual contrast.

1.3 ISSUES IDENTIFIED FOR ANALYSIS

Based on results of the stakeholder group scoping process and in consultation with the BLM and USFS, the following are the areas of concern that were identified.

1.3.1 National Historic Trails

1.3.1.1 El Camino Real de Tierra Adentro National Historic Trail

Established in October 2000, El Camino Real de Tierra Adentro (Royal Road of the Interior) National Historic Trail formally recognizes the primary route between the colonial Spanish Capital of Mexico City and the Spanish provincial capitals at San Juan de Los Caballeros, San Gabriel, and Santa Fe. This trail is jointly administered by the National Park Service (NPS) and the BLM. El Camino Real de Tierra Adentro is recognized in the United States and Mexico as an international historic trade route in the Southwest. A feasibility study prepared by the NPS in 1997 led to its congressional designation along 404 miles between San Juan Pueblo, New

Mexico and El Paso, Texas. The study documented the international significance of the route between the Spanish colonial capitals, and how the road formed part of a network of royal roads that extended from capital to capital. The route continued to be used by other travelers, traders, settlers, soldiers, and merchants once Mexico achieved its independence. The trail crosses several federal agencies, including BLM, USFS, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and reservation lands (Bureau of Indian Affairs); however, the majority of the trail crosses private land (222 miles). For the SunZia Project study area, the trail is generally located within the Rio Grande Valley from Las Cruces to Socorro, New Mexico. Specific to the alternatives evaluated in the EIS are three trail study areas shown on the panel index map (Figure L-1) that occur near Truth or Consequences, San Antonio, and Socorro. El Camino Real occurs on BLM land in each of these study areas.

1.3.1.2 Juan Bautista de Anza National Historic Trail

The Juan Bautista de Anza National Historic Trail (Anza Trail) commemorates the route taken by Anza in 1775-76, when he led a group of colonists from Mexico to found a presidio and mission for New Spain at San Francisco Bay. Established in 1990, this congressionally designated historic trail administered by the NPS is approximately 1,200 miles long, extending from Nogales, Arizona to San Francisco, California. For lands outside NPS units, local land managers and property owners take the lead in implementing the trail and coordinate interpretation with the NPS. The Anza Trail is associated with the following three components:

- Historic Corridor – the historic path traveled by the expedition
- Recreational Trail – a modern recreation trail implemented by local land managers that generally parallels the historic trail corridor. Intended to be a continuous recreational trail from Nogales, Arizona to the San Francisco Bay Area
- Auto Tour Route – published and signed driving route that follows the historic corridor, connecting related historic sites

Only a small portion of the historic trail crosses federal land between Nogales and San Francisco. The trail primarily crosses private land in Arizona, with portions of the trail crossing BLM and state lands as the trail continues west to California. For the SunZia Project study area, the trail is generally located within the metropolitan area of Tucson along the Santa Cruz River, generally parallel to the I-10 corridor to Picacho Peak as it continues north to Casa Grande.

1.3.2 National Scenic Trails

1.3.2.1 Continental Divide National Scenic Trail

The Continental Divide National Scenic Trail (CDNST) extends from the Montana-Canada and New Mexico-Mexico borders, roughly following the mountains that form a watershed divide between the Mississippi River drainage and rivers flowing to the Pacific. Established in 1978, it was designated to provide a scenic, high-quality, and primitive experience along a continuous and appealing route through diverse terrain for travel by hikers and equestrians. At the time of its establishment, it was intended to mimic the scenic trail concept of the Appalachian Trail and Pacific Crest Trail, two previously created National Scenic trails spanning major north-south

cordilleras of the mainland United States. The trail crosses USFS, BLM, state, and private lands through New Mexico; it traverses the town of Lordsburg, New Mexico and the I-10 corridor within the SunZia Project study area between the Pyramid Mountains and the Big Burro Mountains.

1.3.2.2 Arizona National Scenic Trail

The Arizona National Scenic Trail (ANST) extends from the Utah-Arizona and Arizona-Mexico borders, across various ecosystems, terrain, and remote rural landscapes of the state. Conceptualized as the Arizona Trail by Dale Shewalter in the 1980s, the route of this trail was identified and constructed in the 1990s and early 2000s under the lead of Arizona State Parks, with funding by the USFS, BLM, and NPS. The trail was designated as an NST in 2009; the final links completing it from end to end were constructed in late 2012. While trail feasibility studies have been produced for many trails since 1968, including the CDNST, the ANST was exempted from this requirement due to (1) its location on primarily public land, (2) the fact that it was already established for much of its length, (3) its strong local, regional, and state advocates, and (4) its outstanding recreational opportunities.

A trailwide CMP must be developed by the lead agency for a congressionally designated National Trail. At this time, a CMP has yet to be developed for the ANST. The trail crosses USFS, BLM, NPS, state, and private lands from the Utah border to Mexico. It crosses the Project study area near Tucson, at the I-10 corridor near Cienega Creek Natural Preserve between the Santa Rita and Rincon mountain ranges; and it crosses the study area near Oracle and north of SR 77. The ANST does not cross BLM land within the Project study area.

1.3.3 Trails Recommended as Suitable for National Trail Designation

1.3.3.1 Butterfield Overland Mail and Stage Route

Obtaining congressional approval in 2009, the Butterfield Overland Mail and Stage Route is currently under feasibility study by the NPS. As such, the nature and purpose of the trail is not defined but would be consistent with the National Trails System Act, which provides “for outdoor recreation needs of an expanding population” and promotes “the preservation of, public access to, travel within, and enjoyment and appreciation of the open-air outdoor areas and historic resources of the nation.” The proposed Butterfield Trail commemorates the routes pioneered by John Butterfield and the Butterfield Overland Stage Company as they traveled over the “ox-box route” between St. Louis, Missouri and Memphis, Tennessee, and which terminates at San Francisco, California. Within the Project study area, the Butterfield Trail extends from Las Cruces, New Mexico through Eloy, Arizona, crossing BLM, state, and private lands through Arizona and New Mexico. Although the alignment provided by the NPS is still under study, the trail crosses BLM land near Deming and Lordsburg, New Mexico. The majority of the trail crosses BLM land near San Simon, Arizona and Arizona State Trust Land or private land as it continues west toward Tucson.

1.4 STUDY METHODOLOGY

1.4.1 Introduction

For the Project, a detailed Methodology to Conduct Project Analysis for National Scenic and Historic Trails (April 2013) was developed by BLM Recreation and National Trails staff (Administrators and Washington office NTS Managers) and reviewed by associated trail organizations, including: El Camino Real de Tierra Adentro Trail Association, Continental Divide Trail Society, Continental Divide Trail Coalition, Anza Trail Foundation, Anza Trail Coalition of Arizona, and the Arizona Trail Association. Inventory data was used to characterize the affected environment for all national scenic and historic trails, and trails under study or trails recommended as suitable, for all alternatives regardless of jurisdiction. Based on the guidance provided in BLM Manual 6250 and 6280 and consultation with applicable NTS managers, the following was considered: trail components, viewshed analyses, scenic resources, historic and cultural resources, recreation, natural resources, and other landscape elements as applicable. The following agency planning-level data was requested, and project-level data was used where data gaps were identified out to 3 miles on either side of the Project reference centerline. (This 3-mile-wide study area was developed in conjunction with the trail stakeholder group and is consistent with the visual resource section in the Final EIS. Unique landscape features associated with the trail or trail interpretive recreation area beyond 3 miles were identified where appropriate.)

- Planning-level Data
 - Visual Resource Inventory (VRI)
 - Scenic Quality Rating Units (SQRU)
 - Sensitivity Level Rating Unit (SLRU)
 - Visual Distance Zone
 - National Historic Trail federal protection components
 - High potential route segments
 - High potential historic sites
 - National Scenic Trail components
 - Route segments
 - National Trail Rights-of-way/corridor
 - Recreation Spectrum Opportunity (ROS), where available
 - National Scenic and Historic Trail routes and rights-of-way (16 USC 1246 (7)(a))
- Project-level data (i.e., derived from SunZia Draft EIS for applicable resources, qualities, values and associated settings)
 - Identification of recreation areas (i.e., Special Recreation Management Areas, trailheads, connector roads, interpretive kiosks, etc.), trail associated viewing locations, and key observation points (KOP)
 - Identification of historic points of interest related to the trail, listed historic properties, and Center for Desert Archaeology Priority and Proposed Conservation areas
 - Biological data that may include vegetation communities (i.e., wetlands, floodplain, and woodlands), rare species occurrences, critical habitats, and

biological features such as habitat conservation areas, migration corridors, and biological core areas

Figures in this appendix include an index map that illustrates the locations for the Project-level NTS assessment (Figure L-1) and detailed inventory map panels for visual and recreation resources (Figure L-2 through Figure L-17), and cultural, biological, and other natural resources (Figure L-18 through Figure L-33) in the study corridor. Composite impact assessment results are illustrated on map panels (Figure L-34 through Figure L-49).

1.4.2 Inventory (Affected Environment)

1.4.2.1 Trail Components

For each National Trail and alternative route being evaluated in a NEPA analysis, the affected environment identifies and describes (1) the nature and purpose of the National Trail, if available; (2) the trail's resources, qualities, values, and associated setting(s); (3) primary use(s), and (4) the National Trail Right-of-Way and Management Corridor, (5) for NHT, Federal Protection Components, the area of analysis was limited to the high potential route segments, high potential historic sites, and auto tour routes , and (6) National Trail-related National Register (eligible and listed) properties.

- **Nature and Purposes of the National Trail** – The nature and purposes are defined as the character, characteristics, and congressional intent for a designated National Trail, including the resources, qualities, values, and associated settings of the areas through which such trails may pass; the primary use or uses of a National Trail; and activities promoting the preservation of, public access to, travel within, and enjoyment and appreciation of such trails. Only those National Trails that have been through the comprehensive management planning process have a formal nature and purpose statement; however, a similar statement regarding the management of a National Trail can be found in the National Trails System Act, along with related Congressional Reports (e.g., HR 90-1631), and will be used in lieu of the nature and purpose if such language exists.
- **National Trail Resources, Qualities, Values, and Associated Settings** – The resources, qualities, and values are defined as the significant scenic, historic, cultural, recreation, natural (including biological, geological, and scientific), and other landscape areas through which such trails may pass, as identified in the National Trails System Act. Associated settings are defined as the geographic extent of the resources, qualities, and values or landscape elements within the surrounding environment that influence the trail experience and contribute to resource protection. In the context of an implementation action NEPA assessment, only those resources, qualities, values, and associated settings potentially affected by the Project would be inventoried. Based on consultation with the BLM, USFS, NPS, and public trail organizations, a Trail Study Corridor for the SunZia Project was defined as a 6-mile-wide corridor centered on the trail and clipped to lands within 3 miles of the Project alternative reference centerlines. (See Figure L-1 for the locations of the trail inventory.)

- **Primary Use or Uses** – The primary use or uses are defined as the authorized mode or modes of travel, and/or activities identified in the National Trails System Act, enabling legislation, or legislative history, through the trailwide CMP or approved RMP.
- **National Trail Right-of-way and Management Corridor** – The National Trail Right-of-way is described as the corridor selected by the National Trail administering agency in the trailwide CMP, which includes the area of land that is of sufficient width to encompass National Trail resources, qualities, values, and associated settings. The National Trail Management Corridor is described as the allocation established through the land use planning process for a public land area of sufficient width within which to encompass National Trail resources, qualities, values, and associated settings and the primary use or uses that are present or that are to be restored.
- **For NHT, Federal Protection Components (including high potential historic sites and high potential historic route segments) and Auto Tour Routes** – Federal Protection Components are those selected high potential historic sites and high potential route segments and other land- and water-based components of a designated NHT located on federally owned land that meet the NHT criteria listed in the National Trails System Act and that are identified in trailwide CMPs, RMPs, and implementation plans. Auto tour routes are defined as those roads that parallel the NHT and provide opportunities to commemorate and/or interpret the historic route as an alternate experience. These opportunities may occur inside or outside the National Trail Management Corridor. Auto tour route opportunities may include access to NHT high potential historic sites and high potential historic route segments, although it is not required. Auto tour routes are normally restricted to existing all-weather roads or paved highways and may be limited to specific use conditions, per BLM Manual 6280.
- **National Trail-related National Register Properties** – Includes properties formally determined as eligible for inclusion in and properties listed on the National Register by the Secretary of the Interior and all other significant properties that meet National Register listing criteria. This includes any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior.

1.4.2.2 Viewshed Analysis

For NST, a viewshed analysis was conducted out to 3 miles from the continuous route alignment to determine an area where the most intense impacts would occur based on the construction, operation, and maintenance of the Project. (It should be noted that this corridor width is the same as the visual resource study corridor identified for project analysis.) For NHTs, a viewshed analysis was conducted out to 3 miles from high potential sites, high potential segments, and the designated auto tour route. To focus the inventory on resources that may be affected by the Project, the initial viewsheds were clipped to lands within 3 miles of project reference centerlines to produce a project-specific affected environment. The viewshed analysis identified landscape features that are seen and not seen from the National Trail. The viewshed was conducted using a GIS-based visibility analysis technique and then verified during field investigations of affected National Trails. Specifically, the viewshed analyses were conducted:

- at existing recreation and interpretive developments and at critical points that reflect how a trail visitor interacts with the trail, including developed recreation areas such as trailheads, and natural features such as overlook points/pullouts and access points, where identified in the CMP.
- at areas with sensitive resources, qualities, values, and associated settings.
- at regularly spaced intervals along the National Trail tread, trace, and/or management corridor centerline to ensure no gaps in the viewshed analysis.
- for NHTs, National Trail-related National Register eligible and listed properties noted in the CMP; other significant historic trail-related features such as river crossings, springs, and stage stations (where applicable); high potential historic sites and high potential route segments; auto tour routes; and recreation trails (where applicable) that facilitate public access and opportunities for vicarious experiences.

Scenic Resources

Visual Resource Inventory – BLM Resource Management Plans

The BLM Visual Resource Management (VRM) system requires the inventory of scenic values and the establishment of management objectives for those values through a VRM planning process. The VRI process and its resulting information provide the information necessary to characterize the existing or affected environment for visual resources, and are required for management and Project-level decisions. The BLM's Manual H-8410-1 defines the criteria that define VRI components of scenic quality, SLRUs, distance zones, and VRI classifications. VRI data was provided by the BLM field offices (Socorro, Roswell, Rio Puerco, and Las Cruces) and incorporated into the inventory; and VRI data gaps (i.e., where agency VRI data does not exist or the BLM determines that existing data is insufficient) were identified and updated by the BLM field offices for inclusion in the Draft EIS. VRI data, including scenic quality, SLRUs, and distance zones were inventoried by EPG for the Tucson Field Office, per BLM direction (see Appendix D). Initial VRI data gaps for the Project were identified and completed for the EIS. BLM Manual 6280 requires the use of BLM VRI data (scenic quality, sensitivity levels, and distance zones) to characterize the affected environment for all National Trails.

Scenic Quality

Scenic quality as defined by the BLM is the measure of the visual appeal of a tract of land. In the VRI process, public land is given an A, B, or C rating, based on the evaluation of the following seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Class A scenery typically has a higher degree of landscape relief, diversity of water, and vegetation that harmoniously combine and result in a high level of aesthetic appeal. Class B scenery has less variety in the elements that comprise the landscape, but still has some diversity and visual interest. Class C scenery typically does not have much diversity in terms of landscape features, and rates the lowest from an aesthetic perspective. SQRUs are units of land that characterize the natural landscape setting. These settings are associated with similar features that harmonize with each other and result in a particular landscape character. These SQRUs may range in size from several thousand acres to 100 acres or less, depending on the homogeneity of

the landscape features, and take into account man-made features that either enhance or detract from the scenic value. The use of SQRUs to characterize the existing setting of National Trails will provide a consistent definition of setting for all trail resources (visual, recreation, cultural, and biological).

Sensitivity Level Rating Units

Sensitivity levels are a measure of public concern for the maintenance of scenic quality associated with a given tract of BLM land. Public lands are assigned high, medium, or low sensitivity by analyzing the various indicators of public concern, including type of user, amount of use, public interest, adjacent land uses, and special areas, among other factors. Similar to SQRUs, SLRUs characterize the public value of the natural landscape setting and do not always correlate with the most scenic areas.

Distance Zones

Per BLM guidance, landscapes are subdivided into three distance zones based on relative visibility from public viewing locations (i.e., roads, residences, etc.). The three distance zones that the BLM uses to characterize the visibility of BLM administered lands are foreground-middleground (0 to 5 miles), background (5-15 miles), and seldom seen (greater than 15 miles).

Historic and Cultural Resources

Historic and cultural resource data pertaining to high potential sites, high potential segments, and auto tour routes was obtained from the BLM and/or NPS as outlined in the CMP. For the cultural resource study conducted for the EIS, both a Class I records review and a Class II sample inventory were conducted. A detailed Class I records review in support of the proposed Project was conducted to identify prior inventories, research, and previously recorded sites within 0.25 mile of the Project reference centerline for all alternatives corridors considered in the EIS.

Recreation

Land and resource use data (i.e., primary data) that identifies existing and planned land uses were collected within the NST and NHT study area. In addition, recreation data pertaining to trail-related viewing locations and KOPs were also collected within the NST and NHT study area based on the results described in the SunZia Southwest Draft EIS. Information was obtained from various federal, state, and local agency staff and documents, including:

- BLM RMPs concerning recreation resources, visual resource, cultural resources, and special management areas, including special recreation management areas, designated off-highway vehicle areas, Wilderness Study Area, and other authorized land uses that could specifically pertain to National Trails
- New Mexico and Arizona state parks and land departments
- City and County land use plans, and Natural Resource Conservation District plans
- Aerial Imagery
 - Digital Globe Satellite Imagery
 - Esri

Natural Resources

Biological data collected for the EIS (Section 3.6 and Section 4.6) was based in part on the results of public scoping and in consultation with the BLM. The following areas of concern were identified with regard to biological resources and were collected within the NST and NHT study areas:

- Migratory bird corridors and Audubon Important Bird Areas
- Critical Habitat (Southwestern Willow Flycatcher, Mexican Spotted Owl, Silvery Minnow, and ESA-listed fish)
- Riparian Habitat and Floodplain/Cottonwood Gallery Forest
- Habitat Conservation Areas and Biological Core Areas (Pima County)
- Migration and Movement Corridors

Based on consultation with BLM and USFS trail administrators, NPS trail administrators, and local field office resource specialists, vegetation communities occurring within each NST and NHT study area were identified and data were obtained from the Resource Geographic Information System (New Mexico) and Arizona Land Resource Information System. Landscape-defining characteristics, including prominent or distinctive aspects, qualities, and characteristics, are identified as part of the scenic quality rating for scenic resources.

Other Landscape Elements

Existing conditions (i.e., cultural modifications such as developments, facilities, etc.) comprise the relatively intact settings for each NST and NHT that may be affected by the proposed Project. Within the NST and NHT study areas, existing conditions range from naturally appearing to completely modified, based on the presence of existing transmission lines (both high and low voltage), substations, pipelines (water and high pressure natural gas), travel routes (i.e., road rights-of-way), residential and commercial development, and other man-made features that are incongruent as compared to the natural character of affected settings. Existing conditions were evaluated by means of aerial photography and field reconnaissance to determine the location where modifications have affected natural settings and to the relative degree that these conditions have altered the settings within the study areas.

Regarding rights-of-way as they relate to cultural modifications, the Secretary, through the BLM, “may grant easements and rights-of-way upon, over, under, across, or along any component of the National Trails System in accordance with the laws applicable to...[the BLM public lands]...[p]rovided [t]hat any conditions contained in such easements and rights-of-way shall be related to the policy and purposes of...[the National Trails System Act],” (National Trails System Act Sec. 9(a)). To the greatest extent possible, for scenic and historic trails, the BLM shall consider locating proposed rights-of-way outside of Federal Protection Components, high potential historic sites, and high potential route segments; and for NST, to areas of comparative disturbance, in accordance with this policy. The BLM may approve proposed rights-of-way, subject to terms and conditions that are related to the policy and purposes of the National Trails System Act. Through the NEPA process for proposed rights-of-way, the BLM may permit rights-of-way that will not substantially interfere with National Trail purposes, and shall make

efforts, to the extent practicable, to avoid rights-of-way that would be incompatible with the purposes for which that National Trail was established, in accordance with law and this policy.

Setting Description

The setting is defined as the geographic extent of the resources, qualities, and values or landscape elements within the surrounding environment that influence the trail experience and contribute to resource protection in context with the proposed Project alternative reference centerlines. For NSTs, the setting description identifies significant scenic or high visual qualities within the trail study areas. For NHTs, the setting description identifies areas associated with high scenic quality that support the nature and purpose and/or relative freedom from intrusion within and adjacent to high potential sites and segments.

1.4.3 Impact Assessment Methodology

This section focuses on the identification and characterization of scenic and historic trail impacts associated with the Project. Impacts to National Trails would result from the construction and operation of the proposed 500 kV transmission lines and associated substations. The impact assessment was developed in consultation with the BLM and is consistent with and adheres to BLM guidance pertaining to NST and NHT (BLM manuals 6250 and 6280).

As part of the NEPA analysis, the proposed Project was evaluated to determine if it would substantially interfere with or be incompatible with the nature and purposes of a National Trail (see Section 3.3 of the Final EIS for description of each National Trail) or equivalent statement (i.e., purpose of trail identified in the National Trails System Act and Congressional Reports). Significant impacts related to scenic and historic trails would be the result of high impacts on key inventoried resource qualities, values, and associated settings from the Project that cannot be effectively mitigated. The following are general descriptions of the criteria for assessing the intensity of impacts that would result from the construction, operation, and maintenance of the Project; and Table L-1 presents the criteria used in the assessment.

- *High Impacts* – The intended experience of the trail, gleaned from the nature and purpose or similar language in the National Trails System Act, is no longer possible or is substantially compromised based on the construction and operation of the Project. Impacts cannot be effectively mitigated.
- *Moderate Impacts* – The intended experience of the trail is affected but would not be substantially compromised. Mitigation may or may not be necessary.
- *Low Impacts* – The intended experience of the trail would be affected negligibly. Mitigation would probably not be necessary.

Table L-1. Assessing Intensity of Impacts

Intensity of Impacts	Criteria for Assessing Intensity of Impacts
High	<ul style="list-style-type: none"> • Scenic Resources <ul style="list-style-type: none"> – Contrast produced by the Project would demand attention and dominate views from the trail centerline where form, line, color, and texture of Project components would be incongruent with existing landscape or historic features. – High-quality, diverse, and rare or unique scenery (Class A or B) would be modified where the setting is a defining factor for the “high potential route segments” or as seen from historic properties and/or interpretive areas, or scenic trail centerlines. • Historic and Cultural Resources <ul style="list-style-type: none"> – Characteristics of historic properties located in the trail corridor and seen from the trail centerline would be modified to the extent that the National Register eligibility of the trail segments and related historic properties affected would be compromised. • Recreation, including Travel Management <ul style="list-style-type: none"> – Intact resource values, including recreation and National Trail-related travel management opportunities and values would be substantially compromised by the Project. These values would no longer contribute to the character of the trail. • Natural Resources <ul style="list-style-type: none"> – Natural values, including any key contributing values and characteristics would be substantially compromised by the Project (i.e., a riparian area adjacent to a route segment follows what would be cleared for access roads). These values would no longer contribute to the character of the trail. • Other Landscape Elements <ul style="list-style-type: none"> – Presence of developments; facilities; landscape modifications; existing land uses; valid existing rights; surface, sub-surface, or other interests in land ownership; and other variables such as sights, smells, and other experiences that may impact the trail experience. Areas where Project facilities would be located in proximity to, or parallel with (but not immediately adjacent to), landscape modifications that exhibit similar form, line, color, and texture.
Moderate	<ul style="list-style-type: none"> • Scenic Resources <ul style="list-style-type: none"> – Contrast produced by the Project would attract attention from viewers using the trail centerline, and Project components would be co-dominant with existing landscape features. – The inherent quality of interesting, but not outstanding, landscapes (Class B or C) would be modified as seen from historic properties and/or interpretive areas, or scenic trail centerlines. • Historic and Cultural Resources <ul style="list-style-type: none"> – Characteristics of historic properties located in the trail corridor and seen from the trail centerline would be modified to the extent that the National Register eligibility of the trail segments affected may be compromised, but the effect could be minimized. • Recreation, including Travel Management <ul style="list-style-type: none"> – Intact resource values, including recreation and National Trail-related travel management opportunities and values, would be modified by the Project but would remain suitably intact and continue to contribute to the character of the trail. • Natural Resources <ul style="list-style-type: none"> – Natural values, including any key contributing values and characteristics, would be modified by the Project but would remain suitably intact and continue to contribute to the character of the trail. • Other Landscape Elements <ul style="list-style-type: none"> – Presence of developments; facilities; landscape modifications; existing land uses; valid existing rights; surface, sub-surface, or other interests in land ownership; and other variables such as sights, smells, and other experiences that may impact the trail experience. – Areas where Project facilities would be located in proximity to, or parallel with (but not immediately adjacent to), landscape modifications that exhibit similar form, line, color, and texture.

Table L-1. Assessing Intensity of Impacts

Intensity of Impacts	Criteria for Assessing Intensity of Impacts
Low	<ul style="list-style-type: none"> • Scenic Resources <ul style="list-style-type: none"> – Contrast produced by the Project would not be readily apparent from trail centerlines and would be subordinate in the context of existing conditions. – Minimal change would occur to the existing character of interesting and common landscapes (Class B or C) as seen from historic properties/interpretive areas, or scenic trail centerlines. • Historic and Cultural Resources <ul style="list-style-type: none"> – Characteristics of historic properties located in the trail corridor and seen from the trail centerline and the trail segments affected would be modified, but their eligibility for listing on the National Register of Historic Places would likely not be affected. • Recreation, including Travel Management <ul style="list-style-type: none"> – Intact resource values, including recreation and National Trail-related travel management opportunities and values, would be modified negligibly by the Project. Contributing values would continue to define the character of the trail. • Natural Resources <ul style="list-style-type: none"> – Natural values, including any key contributing values and characteristics would be modified negligibly by the Project. Contributing values would continue to define the character of trail. • Other Landscape Elements <ul style="list-style-type: none"> – Presence of developments; facilities; landscape modifications; existing land uses; valid existing rights; surface, sub-surface, or other interests in land ownership; and other variables such as sights, smells, and other experiences that may impact the trail experience. – Areas where the Project would be located in proximity or parallel to an existing transmission line facility with similar landscape modifications and structural elements in regard to form, line, color, and texture, or screened from viewing locations associated with the trail such that the landscape is perceived to be unaltered.

1.4.3.1 Initial Impacts

The intensity of a potential impact on the trail's nature and purpose, and resources, qualities, values, associated settings, and primary use or uses would be used as the basis for assessing initial impacts. The detailed methods to determine initial impacts are consistent with agency-approved analysis methods for the National Trails, as well as visual resources, land use and recreation, cultural resources, and biological resources. (It should be noted that each National Trail has resources, qualities, values, associated settings, and primary use or uses that are unique to the trail; therefore, the resources, qualities, values, associated settings, and primary use or uses may differ between trails and may differ along different segments of the same trail.) The assessment of initial impacts takes into consideration standard mitigation or design features, including but not limited to using non-specular conductors, constructing the towers with dull grey galvanized steel, and employing overland construction techniques where vegetation and topographic conditions allow. A detailed list of standard mitigation can be found in the Final EIS, Table 2-10.

Mitigation Planning and Residual Impacts

After initial impacts have been assessed, standard mitigation measures (including Design Features and Best Management Practices for National Trails and Associated Resources [Manual 6280 – Appendix 1]) would be applied to reduce potential impacts associated with the

construction, operation, and maintenance of the proposed Project to the extent practicable. Where Best Management Practices would not reduce impacts resulting from the proposed Project, selective mitigation measures would be employed, where feasible. The application of these mitigation measures would be applied through the use of an interdisciplinary team (including landscape architects, planners, archaeologists, outdoor recreation planners, and other key resource staff as appropriate for each trail segment) to most effectively reduce impacts on all identified trail resources. A detailed list of selective mitigation measures can be found in the Final EIS, Table 2-11. Off-site mitigation may be applied, where feasible and through negotiations with the Project Proponent, for the life of the development, in an effort to offset significant or high impacts of the Project that are not able to be mitigated. Off-site mitigation measures would be based on the final design of the Project and will be specified in the final Plan of Development (POD), in coordination with applicable agencies and/or trail organizations.

1.4.3.2 Cumulative Effects

Cumulative effects to National Trails would be evaluated in the context of the trail's resources, qualities, values, associated settings, and primary use or uses in a manner similar to the Project-level impact methodology. Direct and indirect effects would be assessed for both construction and operation activities associated with the SunZia Project and Energy Development Scenarios. Note that individual resource cumulative effects are discussed in Section 4.17 in the FEIS (e.g., solar or wind developments). To focus the analysis of cumulative effects as they relate to the Project, the area of analysis for NST would be limited to the continuous trail alignment within the field offices traversed by the Project, in consideration of other reasonably foreseeable projects along the National Trail. For NHT, the area of analysis would be limited to the high potential route segments, high potential sites, and auto tour routes identified in the areas traversed by the Project, in consideration of other reasonably foreseeable projects along the National Trail. The following methods summarize how cumulative effects will be evaluated for potentially effected National Trails.

Trail Resources, Qualities, Values, Associated Settings, and Primary Use or Uses

1. Scenic and Visual Resources
 - a. Cumulative effects of the incremental modification to the integrity of the associated settings and scenic values for which the National Trail was designated
 - b. Cumulative effects to the naturally appearing landscapes associated with the NST or NHT, regardless of scenic quality rating
2. Cultural and Historic Resources
 - a. Cumulative effects to historic/cultural resources consist of the loss of cultural artifacts, features, or sites that could have cultural significance or could yield important information about the National Trail
 - b. Cumulative impacts to the historic settings, and those characteristics that support the historic setting
3. Recreation, including Travel Management

- a. Cumulative effects to high-quality recreation opportunities; relative freedom from intrusion; opportunities for vicarious experiences; and conservation, protection, and restoration of National Trail resources, qualities, values, and associated settings
 - b. Cumulative effects to desired recreation setting characteristics
 - c. Cumulative effects to the primary use or uses of the National Trail
 - d. Cumulative effects to the travel systems in the area, including permanent access that could generate more movement in areas that would not have previously been accessible
4. Natural
- a. Cumulative effects to natural resources (biological, geological, and scientific) relate to ground disturbance and the resulting loss of biological, geological, or other scientific resources
 - b. Cumulative effects to the natural settings that are the geographic extent of the natural landscape elements that influence the trail experience and contribute to resource protection
5. Other Landscape Elements
- a. Cumulative effects

1.5 REGIONAL SETTING

1.5.1 National Historic Trails

1.5.1.1 El Camino Real de Tierra Adentro National Historic Trail

El Camino Real de Tierra Adentro primarily follows the Rio Grande Valley (approximately half the trail), which trends north-south between Texas and northern New Mexico. Generally, the Rio Grande Valley occurs within the Basin and Range province, which is characterized by its isolated, roughly parallel mountain ranges separated by desert basins. The Jornada del Muerto is an example of these broad basins and of upland areas where the historic trail moved away from the Rio Grande Valley. In isolated upland areas, volcanic beds of black lava are present. Mountain ranges often run 50 to 70 miles in length and generally trend north-south. Mountains surrounding this long valley include San Andres to the east and Caballo Mountains to the west, which roughly frame the Chihuahuan Desert landscape. Other prominent mountain ranges include the Franklin, Organ, San Mateo, Magdalena, Ladron, Manzano, Sandia, Ortiz, Jemez, and Sangre de Cristo mountains. Typical vegetation associated with the Chihuahuan Desert includes mesquite, yucca, creosote bush, four-wing saltbush, and snakeweed. Although the Rio Grande Valley is dissected by several arroyos and drainages, water is primarily absent from the landscape until the summer monsoons, which bring torrential rain and ephemeral vegetation. Along the banks of the Rio Grande, cottonwood gallery forest or bosque occur; however, much of the vegetation has been converted to irrigated farmland or developed residential areas.

1.5.1.2 Juan Bautista de Anza National Historic Trail

The Anza Trail passes through two sections of the Basin and Range province, the Sonoran Desert and the Salton Trough. Although the Project study area occurs within the Sonoran Desert, the historic trail continues west through the Salton Trough, which includes desert alluvial slopes and the Gulf of California's delta plain. The Anza Trail crosses through the Pacific Border Province as it traverses the California Coast and narrow ranges with broad fault blocks of the Los Angeles Ranges sections.

Mountain ranges that surround the Santa Cruz River corridor near Tucson include the Santa Catalina, Tucson, Tortolita, and the Santa Rita mountains. Vegetation associated with the Sonoran Desert includes a variety of cacti and succulents; however, creosote is common, mixed with brittlebrush and other low-land desert shrubs. The Sonoran Desert Uplands are typically characterized by a variety of tree species, including paloverde, ironwood, and mesquite, which are commonly found along seasonal drainages. Rivers and wetter drainages may have occurrences of cottonwoods, willows, and salt cedar (an invasive tree). Since the Anza Trail follows major river corridors such as the Santa Cruz River in southern Arizona, floodplains and wetland vegetation are common where portions of the river are not channelized or urbanized (i.e., Tucson).

1.5.2 National Scenic Trails

1.5.2.1 Continental Divide National Scenic Trail

In southwestern New Mexico, the trail follows a route that ranges in elevation from approximately 4,200 feet to 8,050 feet within the Mexican Highland and Datil subdivisions of the Basin and Range and Colorado Plateau physiographic provinces, respectively (Fenneman 1931). The Basin and Range Province is characterized by its isolated, roughly parallel mountain ranges separated by closed (undrained) desert basins. The mountain ranges often run 50 to 70 miles in length and generally trend north-south. The Mexican Highland subdivision is also characterized by basin and ranges and intervening desert plains; however, most of the area has external drainage as opposed to draining internally to basins or bolsons. Mexican Highland vegetation is characterized by creosote, cacti, and yucca at lower elevations while sagebrush and greasewood are dominant at elevations higher than 3,500 feet. The Datil subdivision of the Colorado Plateau contains a greater number of domed, volcanic features than elsewhere in the province and includes the San Mateo, Magdalena, and Black Mountain ranges. This subdivision is characterized by prairie grasslands and rolling piñon-juniper woodland, although the transition between Basin and Range to Colorado Plateau is not distinct. Most of the CDNST in southwestern New Mexico follows the ridgelines of these mountains and foothills, which contain semi-desert grassland vegetation characterized by grasses, shrubs, succulents, and juniper trees along the tops. The landforms in this region are commonly rounded or rolling hills and bajadas, with occasional cliffs or rock spires. Few diverse subdivisions are crossed by the CDNST in southern New Mexico.

1.5.2.2 Arizona National Scenic Trail

The ANST begins at the Arizona-Mexico border, traversing the Basin and Range Province and Colorado Plateau before terminating at the Utah border. In southern Arizona, the trail passes through topography associated with the “Sky Islands,” including the Santa Rita, Rincon, and Santa Catalina mountains. These ranges run 15 to 25 miles in length trending north-south, which is characteristic of the Basin and Range. These mountain tops are typically occupied by conifer woodland and surrounded by semi-desert grassland at lower elevations, which give the appearance of mountain islands. North of the Santa Catalina Mountains, the trail continues across rolling hills and mountains that are occupied by Upper Sonoran Desert vegetation, including mixed cacti species, saguaro, palo verde, mesquite, and ironwood trees. Descending into the Gila River canyon east of Florence, it enters the Lower Sonoran Desert, which continues into the Superstition Mountains. Vegetation associated with the lower Sonoran Desert includes creosote, brittlebrush, and other low-desert shrubs. From Roosevelt Lake, the Trail quickly gains elevation in the Mazatzal Mountains as it transitions from the Basin and Range Province to the Colorado Plateau at the Mogollon Rim. Desert vegetation is largely absent as shrub and juniper-grassland become more dominant at these higher elevations. As the trail nears Flagstaff, dense stands of conifer woodland occur, and at even higher elevations aspen groves start to appear. The trail continues across the Coconino Plateau traversing a mix of grasslands and savanna woodland. The trail crosses the Grand Canyon, which contains a variety of unique geological features and vegetation communities before returning to the conifer woodlands of the Kaibab Plateau (north rim). The Kaibab Plateau occurs at a higher elevation than the south rim of the Grand Canyon and, as a result, dense conifer woodland and grassland meadows are common communities along this stretch of the trail. The trail then leaves the forests of the Kaibab Plateau, descending through juniper studded canyons and then sage flats, where it arrives at the Utah border on the edge of Vermillion Cliffs National Monument. The Vermillion Cliffs are a part of the Grand Staircase, alternating cliff formations that extend for 150 miles from the north rim of the Grand Canyon to southern Utah, and is known for its reddish colored steep cliffs, deep canyons, and sandstone formations. As the trail crosses through these diverse subdivisions, riparian areas will be crossed and may range from dry arroyos to flowing rivers. Specific to the southern region of Arizona, vegetation along the ANST may include a variety of tree species, such as palo verde, ironwood, and mesquite, commonly found along seasonal drainages. Rivers and wetter drainages may have occurrences of cottonwoods, willows, and salt cedar, which is an invasive tree. Dense riparian areas are found concentrated along the Cienega Creek near Tucson.

1.5.3 Butterfield Overland Mail and Stage Route

Similar to El Camino and the Anza Trail, the Butterfield Overland Mail and Stage Route traverses the Basin and Range province in New Mexico and Arizona. The Butterfield Trail crosses through the Mexican Highland subdivision of this province in New Mexico and the Sonoran Desert in Arizona. These subdivisions are characterized by smaller mountain ranges, rock pediments (sloping solid rock), and basins that typically have external drainage as opposed to draining internally to basins and bolsons. Mexican Highland vegetation is characterized by creosote, cacti, and yucca at lower elevations, while sagebrush is dominant at elevations higher than 3,500 feet. Vegetation associated with the Sonoran Desert includes a variety of cacti and succulents; however, creosote is common mixed with brittlebrush and other low-land desert shrubs. The Sonoran Desert Uplands are typically characterized by a variety of tree species,

including paloverde, ironwood, and mesquite, which are commonly found along seasonal drainages. Rivers and wetter drainages may have occurrences of cottonwoods, willows, and salt cedar (an invasive tree). Throughout these subdivisions, the occurrences of springs provided water for historic trail users and were key to the establishment of stations along the stage route. Near Tucson, the Butterfield Trail followed a portion of the Santa Cruz River corridor, primarily because water was present throughout the year; thus floodplain and/or wetland vegetation are common. The majority of the Santa Cruz River in Tucson has been channelized or developed by industrial and residential uses and floodplain vegetation is marginal.

1.6 INVENTORY RESULTS

1.6.1 National Historic Trails

1.6.1.1 El Camino Real De Tierra Adentro National Historic Trail

Nature and Purpose

One of the primary purposes of the trail is to enhance and balance resource preservation and visitor use to satisfy the dual purpose of the National Trails System Act “to provide for outdoor recreation needs of an expanding population” and “to promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open air outdoor areas and historic resources of the nation.” The CMP also identifies planning criteria that will “emphasize the protection and enhancement of the historic values of the trail, while providing the public with opportunities for compatible recreation activities.”

Resources, Qualities, and Values, and Associated Settings

Scenic Resources

Scenic Quality Rating Units

The Rio Grande Valley comprises the majority of El Camino Real Trail study area near Socorro and San Antonio, New Mexico. BLM land associated with Class C scenic quality is associated with lands east of the river where gently sloping bajadas and flat plains are dissected by shallow drainages. Where tributaries of the Rio Grande flow into the valley, wide V-shaped ravines are formed, creating a distinct feature that is common in this Class C landscape. These formations are typical along El Camino Real Trail study area east of the San Mateo Mountains and west of Elephant Butte Reservoir. North of Socorro, Class B scenic quality west of the river is associated with undulating foothills and small mountains. Vegetation is dominated by creosote, bursage, and other Chihuahuan Desert shrub grasses. The Rio Grande is typically associated with Class A scenery due to perennial flowing waters and riparian vegetation.

Sensitivity Level Rating Units

The majority of El Camino Real Trail study area is associated with moderate sensitivity within the Rio Grande Valley. High sensitivity BLM lands occur where travel routes have been designated as a scenic byway and include El Camino Real Scenic Byway and Quebradas Back

Country Byway. Other high sensitivity locations include Fort Craig and San Antonio, New Mexico. Low sensitivity BLM lands are generally associated with the sloping bajada formations at the base of the surrounding mountain ranges along the Rio Grande Valley where access may be more limited.

Distance Zones

El Camino Real Trail study area occurs within the foreground-middleground distance zone. Viewers associated with this distance zone include travel route viewers along I-25 and El Camino Real Scenic Byway, Quebradas Back Country Byway, and other local roads within the Rio Grande Valley.

Historic and Cultural Resources

The historic route of El Camino Real extended approximately 1,600 miles between Mexico City, Mexico and the provincial capitals of San Juan de Los Caballeros (1598 to 1600), San Gabriel (1600 to 1609), and Santa Fe (1610 to 1821). A 404-mile segment that lies within the boundaries of the United States, extending from El Paso, Texas to San Juan Pueblo, was designated an NHT in 2000 and is jointly managed by the NPS and BLM. As described in PL 106-307 [114. Stat. 1074], El Camino Real is “a symbol of the cultural interaction between nations and ethnic groups and of the commercial exchange that made possible the development and growth of the borderland...the exploration, conquest, colonization, settlement, religious conversion, and military occupation of a large area of the borderlands was made possible by this route, whose historical period extended from 1598 to 1882.”

In general, remaining trail sections consist of discontinuous segments of various lengths that have been identified within a specific geographic area. On rural landscapes, these segments may appear as swales or depressions, which may exhibit traces of wagon ruts or may consist of modern road alignments superimposed on the trail. Although a modern road alignment may obscure or even have eliminated all traces of a former trail, the trail segment may still retain aspects of its historic integrity in regards to setting, feeling, and location.

Survey on the east and west terraces of the Rio Grande along Link E180 (Subroute 1A2) near Socorro, New Mexico and Link A140 (Subroute 1B) near San Antonio, New Mexico revealed two segments of Bosquecito Road, a modern road alignment of the former Camino Real (Swanson and Rayle 2012). This north-south trending alignment lies on the east terrace of the river and was recorded within both survey areas. Approximately 25 feet wide, the northern segment recorded at Link E180 consists of a bladed gravel road, while the southern segment recorded at Link A140 consists of a paved asphalt road. No historic features or artifacts associated with El Camino Real were observed within the survey area.

In addition to physical remains of the trail, the BLM and NPS have identified a number of culturally and historically significant sites along its length adjacent to the Rio Grande in New Mexico. These sites consist of, but are not limited to, prehistoric and historic settlements as well historic river crossings, *parajes* (campsites), *estancias* (ranches), military installations (camps and forts), and conflict sites (ambush/massacre and battlefield sites) (NPS and BLM 2004;

Appendix E). Although these resources occur within the larger SunZia Project study area, no high-potential sites or segments were identified within the trail study area.

Recreation

Consultation with the BLM local field offices confirmed that ROS data were not available. Although BLM Manual 6280 encourages the use of ROS to describe recreation values and qualities, Project-level information relating to recreation viewers, recreation land uses, and information in the CMP relating to desired visitor experiences and interpretive historic/cultural facilities was used to describe the affected environment. These data provide baseline information regarding formal recreation components and programmed recreation opportunities, including education and interpretation.

Visitor experiences identified in the CMP relating to El Camino Real include driving the designated scenic byway or auto tour route, touring a historic site, and visiting an interpretive facility/museum. Recreation viewers identified include travel route viewers associated with the scenic byway (I-25, SR 1, and SR 408), Camino Real International Heritage Center, Fort Craig, and the Fort Craig I-25 rest stop. The Quebradas Back Country Byway begins within the trail study area near Socorro and may be a point of interest for trail users. El Camino Real International Heritage Center is located off I-25 with views of the Jornada del Muerto. The historic site of Fort Craig, a high-potential historic site, is also located off I-25 on the west bank of the Rio Grande, south of the Bosque del Apache National Wildlife Refuge and San Antonio, New Mexico. There are no high-potential historic segments or sites associated with the auto tour route located within the trail study area.

Natural Resources

The Rio Grande Valley was the primary location of the historic trail and vegetation was likely limited to wetland plants and/or floodplain/cottonwood gallery forest. Noxious weed species have extensively invaded the river valley and include salt-cedar and Russian olive trees. Other portions of the river valley have been converted to irrigated farmland, which minimizes native floodplain vegetation. Other biological, geological, and scientific resources of the trail are not identified in the CMP and were not present, based on review of Project-level information and field inspections.

Other Landscape Elements

Cultural influences that modify the landscape setting include transportation routes (I-25), utility corridors, communication towers, developments, agriculture, and ranching activities. Specifically within El Camino Real Trail study area near Socorro, residential and agricultural development is prominent within the Rio Grande floodplain. Utilities include an existing 115 kV transmission line that crosses the upland bajada area west of the river and I-25. East of the river, an existing underground gas pipeline parallels the valley before it turns northeast after passing the Quebradas Back Country Byway. South of San Antonio, a 115 kV transmission line parallels the auto tour route for 10 miles and a 345 kV transmission line crosses the auto tour route (I-25)

before it continues north toward Socorro. The West-wide Energy Corridor also crosses through El Camino Real Trail study area near I-25 at the base of the San Mateo Mountain range.

Setting Description

The Rio Grande Valley landscape is a landscape feature that extends for many miles in the middle region of New Mexico. The river and floodplains of the Rio Grande are associated with Class A scenery where dense riparian vegetation, such as cottonwood forest galleries, are present. Although agricultural and residential development is common within the river floodplain near Socorro and San Antonio, due to a scarcity of water in the region, the river is still associated with high scenic or visual quality even though it is highly modified. The Jornada del Muerto, although not associated with high scenic or visual quality, is also a distinct landscape associated with the historic trail and is identified in the CMP as a physiographic feature of interest. The Jornada del Muerto stretches for 80 miles and is primarily undeveloped with the exception of a 345 kV transmission line, an underground pipeline, and I-25. In Socorro, a large portion of the west bank of the Rio Grande is designated as a BLM utility corridor. The designated auto tour route bisects this utility corridor. In San Antonio, designated utility corridors occur on BLM land west of the Rio Grande and parallel El Camino Real auto tour route. South of San Antonio east of I-25, the West-wide Energy Corridor parallels an existing 115 kV transmission line. This regional energy corridor roughly parallels and crosses the designated auto tour route (SR 1, I-25) within El Camino Real Trail study area.

Primary Use(s)

As defined in the CMP (NPS and BLM 2004), trail visitors are defined as those who follow the actual routes of the trail, including those who come into contact with the trail through other avenues (e.g., classroom and scholar-led experience, self-guided study experiences such as web- and archive-based research, and visits to interpretive facilities, such as museum and visitor centers). Primary use of the trail will involve “activities and programming emphasizing the trail’s significance, history, and natural and cultural heritage.”

Recreational opportunities with interpretive and/or education components, such as companion trails for hiking, biking, or horseback riding, will be supported on the NHT in order to convey the experience of the historic travelers in settings similar to those that once existed along El Camino Real. Likewise, an auto tour route following the general course of the Camino Real will be developed to encourage visitation and promote the trail, and to provide a “user-friendly” avenue for visitors to find trail-related resources (NPS and BLM 2004).

National Trail Right-of-way and Management Corridor

El Camino Real Trail Right-of-way and Management Corridor are not explicitly identified in the CMP, although it identifies a 5-mile corridor for resource protection purposes on BLM land.

For NHT, Federal Protection Components including High Potential Route Segments, High Potential Sites, and Auto Tour Routes

No high potential sites or segments were identified within the trail study area. The designated auto tour route includes portions of I-25, SR 1, and SR 408, which are also designated as National Scenic Byway.

National Trail-related National Register Properties

There are no National Trail-related National Register Properties within the trail study areas for Camino Real.

1.6.1.2 Juan Bautista de Anza National Historic Trail

Nature and Purpose

The nature and purpose of the Juan Bautista de Anza NHT is described as a vision for “a traveler to be able to hike, ride horseback, bicycle, and drive on a marked route from Nogales to San Francisco and the loop in the eastern portion of San Francisco Bay.” Along the way, the visitor can experience landscapes similar to those the expedition saw; learn stories of the expedition, its members, and descendants; better understand the American Indian role in the expedition and the diversity of their cultures; and appreciate the extent of the accomplishments of Juan Bautista de Anza and his colonizers.”

Resources, Qualities, and Values, and Associated Settings

Scenic Resources

Scenic Quality Rating Units

The Santa Cruz River comprises the majority of the Anza Trail study area near Tucson, Arizona. There is no BLM land associated with this trail study corridor and the landscape immediately adjacent to the river has been developed. The river corridor has also been highly modified and is primarily channelized throughout its length in Tucson. As the Anza Trail study area moves north of Tucson, more natural landscapes occur near the Tortolita Mountains east of I-10. An isolated parcel of BLM land within the Anza Trail study area occurs that is associated with Class B scenic quality.

Sensitivity Level Rating Units

Moderate sensitivity is associated with an isolated parcel of BLM land near the Tortolita Mountains east of I-10.

Distance Zones

The Anza Trail study area occurs within the foreground-middleground distance zone. Viewers associated with this distance zone are based primarily on travel route viewers along I-10 and SR 87.

Historic and Cultural Resources

Unlike the heavily-traveled Camino Real or Butterfield trails, the Anza Trail represents an exploratory and short-lived colonization route that is “remembered primarily for the expeditions that forged the land route which lead to the founding of the city of San Francisco” (Gough 2012). Due to this circumstance, evidence for the physical remains for the trail blazed by the two Anza expeditions is essentially non-existent. However, the NPS has designated a trail route and identified a number of historically significant sites throughout Arizona and California.

Criteria for historic sites consist of historically significant resources that exhibit at least one direct association with the Anza Trail, the presence of historic remains, scenic qualities, and few intrusions. Interpretive sites include “at least one significant, direct connection to the Anza expeditions, and a high potential to commemorate the trail’s significance or to interpret American Indian, Spanish colonial, or natural history related to the expedition, even though the sites may not retain their historic integrity” (Anza Trail CMP).

Historically significant sites associated with the trail in Arizona, but not the trail study area, include historic missions and settlements such as the Mission San Xavier del Bac and various expedition campsites. NPS sites associated with the trail include Tumacácori National Historic Park and Casa Grande Ruins National Monument (Anza CMP, Appendix B). High potential sites identified within the trail study area consist of Expedition Camp #18/Pueblo de Tuquison, Expedition Camp #19 (Puerto del Azotado) and Lost Morteros Archaeological Site, the Mission San Agustin del Tucson, and the Presidio Historic District (includes the Presidio San Agustin del Tucson). The campsite lies within Christopher Columbus Park in Tucson, approximately 200 meters east of Link F112, and consists of two interpretive Anza waysides with interpretive signage. The Butterfield Trail (recommended as suitable) historically occurred within the Santa Cruz River corridor where the Anza expeditions occurred.

Recreation

For the SunZia Project, the historic Anza Trail is primarily associated with the developed area of Tucson; thus, data pertaining to ROS is not applicable. Project-level information relating to recreation viewers was used, as well as information in the CMP relating to desired visitor experiences and interpretive historic/cultural facilities.

The CMP identifies visitor use along the Anza Trail as opportunities to hike, bike, ride horseback, and tour by motor vehicle. Recreational retrace routes provide a multiple use, non-motorized, off-road continuous trail that connects federal components and high potential segments. The Santa Cruz River is identified as an interpretive region or theme that corresponds to the six geographic areas along the trail between Nogales and San Francisco. This river park contains a developed recreational trail along the Santa Cruz River, which extends through the Tucson metropolitan area north toward Picacho. There are plans for recreational trail development within the river corridor within the Tucson metropolitan area. Within the Anza Trail study area, I-10 from Tucson to Picacho is identified as the designated auto tour route (although it is not currently signed) and is a Pima County designated scenic road. An alternative auto tour route that generally follows Mission and Silverbell roads runs close to the historic corridor and provides access to a recreational trail along the Santa Cruz River Parkway; it is also

recognized in the RMP and is signed by both Pima County and the NPS. In Pinal County, from Picacho to Casa Grande, a designated auto tour route occurs along SR 87. There is a high potential historic interpretive site in the Christopher Columbus Park north of the Santa Cruz River Park (interpretive signs and a new trailhead are located here). The Anza Trail Coalition of Arizona and Anza Trail Society have identified three future interpretive kiosk locations for the Anza Trail; one for the Pinal County Fairgrounds, a second near the Red Rock Post office, and a third near the Red Rock Water Tower.

Natural Resources

Since the Anza Trail primarily follows major river corridors, floodplains and wetland communities were common vegetation communities encountered by historic trail users. In the Sonoran Desert, the Santa Cruz River flowed both above and below ground in large floodplains. Historically, water pumping for agriculture, residential, and urban use have contributed to the creation of the channelized river and flow has been reduced. Invasive trees have also changed the vegetation community along the river. Threatened and endangered species that may occur within the trail study area would primarily be associated with cottonwood forest galleries or mesquite bosques habitat areas, which do not occur within the developed area of Tucson.

Other Landscape Elements

Cultural modifications within the Anza Trail study area include development associated with Tucson such as industrial, commercial, and residential areas. Existing 115 kV and 138 kV transmission lines occur within portions of the Santa Cruz River parkway and are immediately adjacent to the Anza Trail. The I-10 corridor and channelized river modifications are also an industrial-scale modification that is adjacent to the Anza Trail. The CMP acknowledges that many portions of the historic route pass through urban or highly developed areas where there is little or no semblance of how the landscape appeared during the Anza expedition.

Setting Description

The Anza Trail occurs within the developed area of Tucson, primarily along a channelized river corridor that parallels I-10 and several transmission lines. The CMP acknowledges that many portions of the historic route pass through urban or highly developed areas where there is little or no semblance of how the landscape appeared during the Anza expedition. In this area, the Santa Cruz River Parkway is the developed Anza recreational trail. The adjacent mountain ranges and peaks surrounding Tucson may be the only landscapes associated with high scenic or visual quality for the Anza Trail in this area and are identified in the CMP as landscape features that correspond to expedition journals. More natural landscape settings occur for the Anza Trail north of Tucson near the Tortolita Mountains; however, cultural modifications such as I-10 are evident but not as dominant as the urban area of Tucson.

Primary Use(s)

As defined in the CMP, “management objectives for visitor experience emphasize promotion of public understanding, appreciation, and enjoyment of the Anza Trail and outdoor recreation”

(Anza Trail CMP). These objectives are obtained by conveying the experience of the colonists in settings similar to those of 1775, providing accurate interpretation at certified locations, and linking historic sites and trail segments with a recreational trail and an auto route.

National Trail Right-of-way and Management Corridor

The Anza Trail Right-of-way and Management Corridor is not explicitly identified in the CMP, with the exception of the following statement “the Anza Trail is defined as a historic trail corridor, an area of varying widths depending upon the specifics of the terrain and the historic and archaeological evidence.” The Anza Trail historic corridor and potential alignments of the Anza recreational trail are delineated in the Map Supplement to the CMP.

For NHT, Federal Protection Components including High Potential Route Segments, High Potential Sites, and Auto Tour Routes

High potential sites within the trail study area consist of Expedition Camp #18/Pueblo de Tuquison, Expedition Camp #19 (Puerto del Azotado) and Los Morteros Archaeological Site, the Mission San Agustin del Tucson, and the Presidio Historic District. Expedition Camp #19 is part of the Los Morteros Archaeological Site, and lies approximately 1 mile west of Link F510. The Mission San Agustin del Tucson lies on the west side of the Santa Cruz River in downtown Tucson, approximately 500 feet west of Link F112. The site retains subsurface remains of the Mission, including intact foundation walls. The Presidio Historic District, which consists of approximately 90 historically and architecturally significant structures within a 32-acre area downtown, includes the remains of Presidio San Agustin del Tucson, which lies approximately 0.3 mile east of Link F112. I-10 from Tucson to Picacho is identified as the designated auto tour route and is a Pima County designated scenic road.

National Trail-related National Register Properties

There are no National Trail-related National Register Properties within the Anza Trail study areas.

1.6.2 National Scenic Trails

1.6.2.1 Continental Divide National Scenic Trail

Nature and Purpose

One of the primary purposes of the CDNST is to provide a “continuous, appealing” route designed for travel by hikers and equestrians, as well as other compatible land uses. While in some instances the trail is located along roads that would allow motor vehicle use, the intention for future development is to relocate the trail entirely offroad to limit use to non-motorized recreation. In 1997, a Forest Service Memorandum clarified this intent, stating that “It is the intent of the Forest Service that the CDNST will be for non-motorized recreation...Allowing motorized use on these newly constructed trail segments would substantially interfere with the nature and purpose of the CDNST.” In 2009, the amended CMP describes the nature and

purposes of the CDNST as “...to provide high-quality scenic, primitive hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor.”

Resources, qualities, and values, and associated settings

Scenic Resources

Scenic Quality Rating Units

The majority of the CDNST study area near Lordsburg, New Mexico traverses Class C scenic quality associated with Chihuahuan semi-desert plains. The Lordsburg Valley is characterized by low, sparse shrub vegetation that typically surrounds smaller mountain ranges and foothills. The adjacent Pyramid Mountains are associated with Class B scenic quality where unique pyramidal or conical peaks with steep rock cliffs are typical. The CDNST crosses through these mountains and into the valley before continuing into the Gila National Forest north of Lordsburg.

Sensitivity Level Rating Units

The majority of the CDNST study area is associated with high sensitivity, which includes the I-10 corridor. Areas associated with moderate sensitivity include the Pyramid Mountains. Low sensitivity lands generally occur in flat valley areas with few local travel routes north of Lordsburg.

Distance Zones

The CDNST study area occurs within the foreground-middleground distance zone. Viewers associated with this distance zone include travel route viewers along I-10 and other major travel routes.

Historic and Cultural Resources

The CP does not identify specific historic or cultural resources associated with this segment of the CDNST, although the Butterfield Overland Mail and Stage Route crosses the CDNST in the town of Lordsburg.

Recreation

Consultation with the BLM local field offices confirmed that ROS data were not available. Project-level information relating to recreation viewers was used, as well as information in the CP relating to desired visitor experiences and interpretive facilities. The CP states that on lands administered by the BLM, the CDNST is considered a high sensitivity level travel route. There are no developed recreational facilities for the CDNST in the trail study area. Connecting travel routes may provide access for trail users and were inventoried as a resource value. Trail users in Lordsburg may be limited to access points near SR 90 and local roads south of Lordsburg, including SR 494 and Animas Street. The location of the trail through Lordsburg primarily

provides the trail user services rather than primitive or semi-primitive non-motorized recreation experiences as identified in the CP.

Natural Resources

The CP does not identify specific natural resources, including biological, geological, and scientific resources for the trail study area. Based on Project-level data, the Lordsburg Valley is characterized by Chihuahuan semi-desert grassland vegetation. The desert foothills of the Big Burro Mountains support mostly grasses and shrubs, as well as occasional juniper, and a desert drainage dissecting it is occupied by xeroriparian scrub. There are no perennial streams, washes, intermittent streams, or wetlands within the CDNST study area. The Animas Valley is bounded by the Peloncillo Mountains to the west, the Animas and Pyramid mountains to the east, and Burro Mountains to the North.

Other Landscape Elements

The CDNST traverses the developed area of Lordsburg that is associated with urban residential, commercial, industrial, and rural residential development. The I-10 is a major interstate travel corridor that bisects the town. Other major travel routes interconnecting with I-10 include SR 90, which heads northeast to Silver City, and SR 70, which heads northwest towards Duncan, Arizona. The trail study area south of Lordsburg is traversed by several underground pipelines; the West-wide Energy Corridor is also located south of these utilities. The trail study area north of Lordsburg is also traversed by several utilities, including a 115 kV transmission line, a 345 kV transmission line, two pipelines, and the Hidalgo Substation. In this panoramic valley landscape, the development of Lordsburg is visible to trail users for both study areas.

Setting Description

The CDNST occurs primarily within the developed area of Lordsburg and the rural areas of Lordsburg Valley. In the southern trail study area, cultural modifications that have locally modified the landscapes in the CDNST study area include local transportation routes (SR 494 and Animas Road), development and residences associated with the city of Lordsburg, the I-10 corridor, underground pipelines, and the Southern Pacific Railroad. In addition, development associated with the ghost town of Shakespeare and the ghost town and associated abandoned mine of Valedon have locally modified the landscapes. The trail study area north of Lordsburg is also traversed by several utilities, including a 115 kV transmission line, a 345 kV transmission line, two pipelines, and the Hidalgo Substation. The CP acknowledges that isolated portions of the trail may pass through developed areas where there are few primitive or semi-primitive recreational opportunities. The adjacent mountain ranges and peaks surrounding the Lordsburg Valley may be the only landscapes associated with high scenic or visual quality for the CDNST in this area. More natural landscape settings occur for the trail north of Lordsburg near the Big Burro Mountains; however, cultural modifications such as the existing transmission lines and Hidalgo Substation are dominant.

Primary Use(s)

The primary use of the CDNST is to provide recreational opportunities of national significance as the 3,100-mile trail traverses from Mexico to Canada. The CP identifies the Continental Divide as a trail for users to enjoy a greater diversity of physical, social, and managerial settings than found on any other extended NST.

National Trail Right-of-way and Management Corridor

The CDNST CP identifies a 50-mile-wide “zone of concern” that lies on either side of the geographical Continental Divide. The CP states that initial trail location and subsequent relocation of rights-of-way may occur within this zone of concern without further Acts of Congress. It further states that the trail should be located as close to the geographic Continental Divide as possible, but as far away as necessary to provide an economically feasible, environmentally compatible route that offers safe travel and diverse recreational experiences. Based on this information, it is assumed that the trail right-of-way and management corridor could potentially occur within this zone of concern, although the width of these areas is not explicitly stated.

National Trail-related National Register Properties

There are no known National Register Properties associated with the CDNST.

1.6.2.2 Arizona National Scenic Trail

Nature and Purpose

Because the ANST has not been described in a trail feasibility study or CMP, the nature and purpose of the trail have yet to be defined in federal policy. However, references to the trail in its 2009 congressional designation emphasize its intention as a non-motorized multi-use recreational trail, in a manner consistent with the National Trails System Act of 1968. Senate Report 110-290 on S. 1304 (The Arizona National Scenic Trail Act), April 10, 2008, describes the ANST’s background and need thusly: “The trail is intended to be a primitive, long distance trail that highlights the State’s topographic, biologic, historic, and cultural diversity.” In support of this designation, U.S. Senator John McCain (AZ) referred to the “rugged, spectacular scenery” and “the wide range of ecological diversity in the state” found along the trail, lending his support to its designation as an NST in order to “ensure the preservation of a corridor of open space.”

Resources, Qualities, and Values, and Associated Settings

Scenic Resources

Scenic Quality Rating Units

The ANST study area near the Black Hills is characterized by more traditional Sonoran Desert vegetation, including saguaro, mixed cacti, and shrub species along with the occasional drainages, which typically contain paloverde or other desert trees. The topography within the

Black Hills area is typically rolling with V-shaped ridgelines, and is associated with Class B scenery. A portion of this study area within the San Pedro River Valley is characterized by upper bajadas where the topography is more rolling, with large V-shaped dissections that resemble small, rolling foothills. Vegetation is typically more diverse and may include mesquite, acacia, creosote, ocotillo, and cholla species. The ANST study area near Tucson is primarily associated with Class B scenic quality, where gently sloping bajadas occur at the base of the adjacent Rincon and Empire Mountain ranges. Slightly undulating terrain is dissected by washes and contains a greater variety of upland Sonoran Desert vegetation, including mesquite, paloverde, and ironwood trees. This area is a transitional area between Chihuahuan and Sonoran Desert species where cacti, yucca, agaves, and other shrub and grass species are mixed.

Sensitivity Level Rating Units

The entire study for the ANST is delineated as high sensitivity.

Distance Zones

The ANST study area occurs within the foreground-middleground distance zone. Viewers associated with this distance zone include trail viewers, I-10, and other major travel routes.

Historic and Cultural Resources

There are no known historic or cultural resources associated with the ANST because the trail was constructed to avoid these sensitive resources; however, cultural resources associated with the ANST have not been fully inventoried (L. White, personal communication, 2013). The Butterfield Trail (recommended as suitable) historically occurred along the valley between the Rincon Mountains and Santa Rita Mountains and crosses the ANST near Cienega Creek. Although the exact location of the trail is not documented at this time, it is likely that the perennial waters of Cienega Creek were a key reason to establish the Cienega Creek Station for the overland route.

Recreation

Consultation with the BLM local field offices confirmed that ROS data were not available. Project-level information relating to recreation viewers was used. The portion of the ANST that lies within the study area in the Black Hills region may have a limited amount of use in this area, Although it is easily accessible from Oracle, user data is unknown for the majority of the trail. Occurring in a remote section north of Oracle, the trail segment is approximately 27 miles between Tiger Mine Trailhead and Freeman Road Trailhead. Along this portion of the trail, hikers, equestrians, and mountain bikers can follow a maintained path through a remote portion of the Black Hills whose major features are Camp Grant Wash and Antelope Peak. Portions of the trail traverse the Black Hills ridges, offering panoramic views of adjacent ranges including the Galiuro, Santa Catalina, and Rincon mountains. There are no public water caches in this section of the trail, though there are numerous tanks and wells of various states of water reliability and quality. At the Freeman Road Trailhead, approximately 1.8 miles north of the ANST study area, there are developed recreational facilities that include a trailhead marker, large parking area, public water cache, benches, and signage. At the Tiger Mine Trailhead, located off

the junction of Tiger Mine Road and SR 77, there is a pull-out space for parking and a trailhead marker. Other developed recreation facilities that are a resource value include the American Flag Trailhead and American Avenue Trailhead located near the town of Oracle. Although the American Flag Trailhead is located just outside the trail study area, it provides an interesting recreation resource for the trail in this area, since it is located within the American Flag Ghost Town. The American Flag Trailhead provides an access point to the gateway community of Oracle for long-distance hikers. The towns of San Manuel and Oracle are identified by the Arizona Trail Association as Gateway Communities, which provide visitor services such as food, water, and other tourist amenities. SR 77 provides primary access to these communities and, for the purposes of this assessment, is inventoried as a resource value for the trail. Dudleyville is another Gateway Community for the trail, and Freeman Road provides primary access to the Freeman Road Trailhead. Although Freeman Road is 2.5 miles north of the trail study area, this travel route is identified as a resource value for the trail because it leads to the trail segment origination/termination point at Freeman Road Trailhead.

The portion of the ANST that occurs within the southern study area near Vail may have a greater amount of use because of the close proximity to other recreation attractions such as Cienega Creek, Colossal Cave, Saguaro National Park, and the Rincon Mountains Wilderness. The trail alignment passes through Colossal Cave Mountain Park (a Pima County Recreation area), and trail users can access the cave by following a connecting unpaved road for approximately 1 mile. Other developed recreation facilities within this park include picnic areas and La Posta Quemada Ranch, which is a day ranch for horseback riding. Cienega Creek Natural Preserve is a Pima County recreation area that requires a permit to enter. The Gabe Zimmerman Davidson Canyon trailhead provides parking and access to the preserve, as well as access to the ANST, which traverses the preserve. Use of the trail is common in this area by birders, hikers, and equestrians, as well as by mountain bikers who commonly travel from Pistol Hill Road to the Cienega Creek. The town of Vail is identified by the Arizona Trail Association as a Gateway Community and is located to the northwest of the trail off I-10. Several travel routes in the area may serve as a resource value for the trail, including designated scenic routes SR 83 (Patagonia Scenic Byway) and I-10 (Pima County designation), which provide regional access to the trail. Other local travel routes that serve as a resource value for the trail include the Old Spanish Trail, Pistol Hill Road, and Pantano Road.

Natural Resources

Based on Project-level data, the northern trail study area in the Black Hills is characterized by rolling hills and bajadas occupied by traditional Sonoran Desert vegetation, including saguaro, mixed cacti, and shrub species along with the occasional drainages, which typically contain paloverde or other desert trees. Small stands of Arizona chaparral can be found along the crests of some of these foothills. The upper foothills of the adjacent mountain ranges (Santa Catalina and Galiuro mountains) are occupied by oak and piñon-juniper woodlands, with coniferous and aspen forested areas typically associated with the upper reaches of the mountain ranges.

The southern trail study area near Vail is characterized by gently sloping bajadas that occur at the base of the adjacent Rincon and Empire Mountain ranges. This area is also a transition zone between the Sonoran and Chihuahuan Desert vegetation communities, which results in a mixed desert cacti landscape and semi-desert grassland. Cienega Creek is identified as an important

water, wildlife, and recreation resource to southern Arizona. It is also a unique and rare low-elevation perennial water resource that contains mature cottonwood gallery forests and dense mesquite bosques. Diverse wildlife species are supported by Cienega Creek, including native fish, birds, and amphibians, many of which are rare or threatened and endangered. Cienega Creek is classified as an “outstanding state resource water” by the Arizona Department of Environmental Quality. Cottonwood gallery forests are found concentrated along the lower portions of Davidson Canyon and La Posta Quemada Wash. Ephemeral washes that cut across bajadas and into the surrounding valley landscapes support xeroriparian vegetation. These include the upper portions of Davidson Canyon and La Posta Quemada Wash. There tends to be less variety and density of riparian vegetation along these smaller drainage ways.

Other Landscape Elements

There are few cultural modifications and existing utilities within the northern study area near Oracle. A small portion of the study area would be crossed by two existing 500 kV transmission lines and pipelines that would roughly parallel the trail as it nears Freeman Road. Other modifications are primarily limited to unpaved access roads.

As the trail descends from the foothills of the Santa Rita and Rincon Mountains towards Cienega Creek, multiple developments are crossed. These include a dirt road and shelters associated with Colossal Cave Mountain Park, I-10, three paved roads (Pantano Road, Charolais Road, and AZ SR 83), the Southern Pacific Railroad, two bridges for transportation infrastructure, and existing 345 kV transmission lines. In some instances, these features dominate the view, but rolling terrain partially screens these developed facilities. Residential development also occurs on the foothills of the Rincon Mountains, which is within the ANST southern study area. Many of these features can be seen along the trail as it parallels Davidson Canyon between the vicinity of the Gabe Zimmerman trailhead and the trail’s crossing of Charolais Road.

Setting Description

The Black Hills is a remote landscape characterized by rolling hills and upper Sonoran Desert vegetation with some cultural modifications near the trail. Although there are existing utility infrastructure within the northern study area, including two 500 kV transmission lines and two underground pipelines, they do not immediately parallel the trail alignment. One pipeline crosses the trail perpendicularly 2 miles north of Link C670; and near Freeman Road one pipeline and two 500 kV transmission lines roughly parallel the trail within 2 miles. Near Coronado National Forest, two additional pipelines cross the trail south of SR 77. The distant mountain ranges and peaks adjacent to the Black Hills are associated with high scenic or visual quality for the ANST in this area, including the Santa Catalina Mountains and Galiuro Mountains. The southern study area occurs near the developed area of Tucson and cultural modifications are evident. Three 345 kV transmission lines cross the study area and parallel the ANST near Cienega Creek north of I-10. Three underground pipelines also cross the ANST near the I-10. South of the highway, several other transmission lines cross the trail, including 115 kV, 138 kV, 230 kV, and 345 kV transmission lines that share the same utility corridor entering Tucson from the east. Cienega Creek, Davidson Canyon, and the adjacent mountain ranges and peaks surrounding this area south of Tucson are associated with high scenic or visual quality for the trail. More natural

landscape settings occur for the ANST as it passes through this developed rural area of Tucson into Saguaro National Park. Cultural modifications such as the I-10 and these utility corridors are evident and dominate this enclosed landscape.

Primary Use(s)

The CMP for the ANST has not been completed; therefore, primary use is not defined. Although Senate Report 110-290 on S.1304 (April 10, 2008) states that "...[t]he primary uses are expected to be hiking, equestrian use, and mountain bicycling..." and House Report No 90-1631 states that "...the use of motorized vehicles by the general public along any national scenic trail shall be prohibited..." motorized use does occur on the ANST where it is located alongside existing roads, such Tiger Mine.

National Trail Right-of-way and Management Corridor

The CMP for the ANST has not been completed; therefore, the trail right-of-way and Management Corridor are not defined.

National Trail-related National Register Properties

The CMP for the ANST has not been completed; therefore, National Trail-related National Register properties have not been identified.

1.6.3 Trails Recommended as Suitable for National Trail Designation

1.6.3.1 Butterfield Overland Mail and Stage Route (Historic)

The Butterfield Trail is currently being evaluated by the NPS for potential nomination as an NHT. Resource protection and preservation of historic and cultural sites, as well as associated scenery, are anticipated if this trail is congressionally designated. Similar to other National Trails, the values, characteristics, and settings for Butterfield Trail would likely include scenic resources, historic and cultural resources, recreation, and other resources as subsequently described.

Values, Characteristics, and Settings

Scenic Resources

Scenic Quality Rating Units

The majority of the Butterfield Trail study area between Deming, New Mexico and San Simon, Arizona traverses Class C scenic quality associated with Chihuahuan semi-desert plains. These flat plains or valleys are characterized by low, sparse shrub vegetation that typically surround smaller mountain ranges and foothills. These flat valley areas include the Deming, Lordsburg, and San Simon valleys. The adjacent mountain ranges are characterized by unique pyramidal or conical peaks with steep rock cliffs. These ranges include the Cooke's Range, Pyramid

Mountains, and Peloncillo Mountains, which are associated with Class B scenic quality. Lordsburg Mesa is also associated with Class B scenic quality where rolling hills are dissected by drainages containing a greater variety of desert vegetation. In Tucson, the landscape setting is highly developed; therefore, SQRUs are not delineated.

Sensitivity Level Rating Units

The majority of the Butterfield Trail study area is associated with high sensitivity and includes Cooke's Range, the I-10 corridor, the Peloncillo Mountains, and the Rincon Mountains. Areas associated with moderate sensitivity include other major travel routes that connect to I-10. Low sensitivity lands generally occur in flat valley areas, with few local travel routes near Lordsburg and the Arizona-New Mexico border and the metropolitan Tucson area.

Distance Zones

The Butterfield Trail study area occurs within the foreground-middleground distance zone. Viewers associated with this distance zone include travel route viewers along I-10 and other major travel routes.

Historic and Cultural Resources

The historic southern route of the Butterfield Trail extended some 2,800 miles from St. Louis, Missouri to San Francisco, California. From 1858 to 1861, the Butterfield Overland Mail Company operated a stagecoach line and provided mail service along this route. Although the company was short-lived, the route remained the principal southern travel corridor to the Pacific coast until the construction of the Southern Pacific Railroad in the early 1880s.

In general, remaining trail sections consist of discontinuous segments of various lengths that have been identified within a specific geographic area. On rural landscapes, these segments may appear as swales or depressions that may exhibit traces of wagon ruts, or may consist of modern road alignments superimposed on the trail. Although a modern road alignment may have obscured or eliminated all traces of a former trail, the trail segment may retain aspects of its historic integrity in regards to setting, feeling, and location. For example, Class II survey conducted in southeastern Arizona in support of the current study (Swanson and Rayle 2012) identified a segment of the Butterfield Trail that currently serves as an in-use county road (Doubtful Canyon Road).

In addition to physical remains of the trail, a number of culturally and historically significant sites, indirectly or directly associated with the operation of the trail, lie along its length across New Mexico and Arizona. These sites may include, but are not limited to, natural springs, stage stations, trail/survey markers, military installations (camps and forts), and conflict sites (ambush/massacre and battlefield sites).

Selection of the trail route used by the Butterfield Overland Mail Company was contingent on a number of factors, including the availability of water (Jackson 1952). Due to this circumstance, many stage stations were constructed in close proximity to natural water sources, such as Cooke's Spring and Cow Springs (Ojo de las Vacas) in New Mexico, and Dragoon Springs in

Arizona. In most cases, use of the water resources at these locations has occurred for centuries, if not millennia. In addition to their historical significance, springs such as these are generally considered spiritually significant to Native Americans.

During its period of operation (1858 to 1861), the Butterfield Overland Mail Company constructed a number of home and swing stage stations along its length to resupply stages with fresh provisions, drivers, and teams. In general, stage stations were constructed at 20-mile intervals; however, distances varied due to the terrain and availability of water. Swing stations, also called changing or relay stations, were used to provide a change of teams for the coaches. These stations typically consisted of a single house structure and corral, and were not intended to provide services or amenities to passengers. On average, stagecoaches would spend 10 minutes at a swing station while the teams were changed out (Couchman 1990). Home stations (e.g., Mesilla Station), which occurred with less frequency along the route, provided more substantial amenities; in addition to teamsters, home stations typically housed a stationmaster, herders, harness makers, and blacksmiths. These locations typically afforded stage passengers the opportunity to purchase additional supplies (Norred 2010).

Class II cultural survey undertaken for the current study (Swanson and Rayle 2012) identified a number of dry-laid rock cairns along the Butterfield Route where no physical traces of the trail remain. Examination of the spatial distribution of these cairns as well as the local geology suggests that they may have served as trail markers to guide stagecoach drivers along the correct route in areas where local soil formation processes may have hindered the formation of ruts and other obvious trail signatures during the period the Butterfield Overland Mail Company was in operation.

The Butterfield Trail route was also a primary transportation corridor for military operations in the New Mexico Territory, and remained so throughout much of the late nineteenth century. Four historic military installations have been identified along the trail length: Fort Fillmore (Mesilla), Fort Cummings, Camp Mimbres, and Fort Bowie. Fort Fillmore and Fort Bowie served as stagecoach stops during the period the Butterfield Overland Mail Company was in operation, and both remained important posts throughout the Civil War and subsequent Apache Wars. Fort Cummings and Camp Mimbres were constructed after the Confederacy's failed New Mexico Campaign of 1862. Fort Cummings, constructed to protect the stage route and to control the Apachean groups in the region, remained in operation until the end of the Apache Wars. Camp Mimbres appears to have served only as a temporary cavalry camp for elements of the California Column, and was abandoned shortly after the war (Brandes 1959; Fugate and Fugate 1989; Julyan 1996; Masich 2006).

A number of historically significant events associated with civilian and military conflicts occurred along the Butterfield Trail route through western New Mexico and eastern Arizona. Although the locations for some these events are known, the majority of sites remain speculative or unidentified. In New Mexico, one of the most notorious stretches of the Butterfield Trail consisted of a 4-mile span extending through Cooke's Canyon. Throughout the 1860s, and even as late as 1880, the pass was infamous for Apache attacks and ambushes that left an estimated 400 emigrants, soldiers, and civilians dead by the roadside (Fugate and Fugate 1989). In Arizona, a series of events associated with the New Mexico Campaign (1862) occurred along the

Butterfield Trail, including the First and Second Battle of Dragoon Springs, the Battle of Picacho Pass, and the Battle of Apache Pass (Finch 1996).

Recreation and Other Resources

Based on previous CMPs developed for the Juan Bautista de Anza and El Camino Real de Tierra Adentro NHTs, it is likely that trail-related interpretation and education opportunities would be encouraged and supported. Recreational opportunities would likely involve similar companion trails for hiking, biking, or horseback riding in order to convey the experience of the historic travelers in settings similar to those that once existed along the Butterfield Trail. In Lordsburg, the Butterfield Trail crosses the CDNST, which may provide some interpretive opportunities for both National Trails. In Arizona, the Butterfield Trail crosses the Anza NHT and the Arizona NST in Tucson, although there are no existing interpretive opportunities for the trail at these crossings. Major travel routes that cross the trail are limited to I-10 and SR 26, which are considered a potential recreation resource value for this assessment.

Setting Description

East of Deming, the Butterfield Trail alignment under study crosses SR 26 and a utility corridor with a 115 kV and 345 kV transmission line, which are immediately adjacent to each other. There are several unpaved roads in the study area although residences are absent, resulting in a more intact and natural landscape setting than areas near Deming, Lordsburg, or Tucson. The Goodnight Mountains and Cooke's Range are crossed by the historic trail and are associated with high visual quality.

A portion of the Butterfield Trail occurs primarily within the developed area of Lordsburg and the rural areas of Lordsburg Valley. Within the valley, several existing cultural modifications are evident, including the pipeline corridors to the south, I-10, and transmission line corridors to the north. The adjacent mountain ranges and peaks surrounding the Lordsburg Valley may be the only landscapes associated with high scenic or visual quality for the trail in this area. More natural landscape settings occur for the trail north of Lordsburg near the Big Burro Mountains; however, cultural modifications such as the existing transmission lines and Hidalgo Substation are dominant. Near the Arizona-New Mexico Border, the Butterfield Trail crosses through the Peloncillo Mountains, which are associated with high visual quality; however, an existing underground pipeline also passes through these mountains. In addition to the I-10 and rural residences associated with San Simon, this pipeline is one of the few cultural modifications in the trail study area. Portions of the West-wide Energy Corridor occur within it as well.

The trail study area near Vail includes several cultural modifications. Near the alignment under study, three 345 kV transmission lines traverse the study area and may parallel the trail alignment north of I-10. One underground pipeline also crosses the study area north of I-10. Cienega Creek and the adjacent mountain ranges and peaks surrounding this area south of Tucson are associated with high scenic or visual quality for the Butterfield Trail. Cultural modifications such as the I-10 and these utility corridors are evident and dominate this loosely enclosed landscape. As the Butterfield Trail enters the urban area of Tucson, the landscape setting becomes increasingly developed and dominates the setting. The Butterfield Trail

alignment under study also occurs within the developed area of Tucson, primarily within the Santa Cruz River, which is a channelized river corridor that is parallel to the I-10 and several transmission lines. The adjacent mountain ranges and peaks surrounding Tucson may be the only landscapes associated with high scenic or visual quality for the historic trail in this area. More natural landscape settings occur for the Butterfield Trail alignment north of Tucson near the Tortolita Mountains; however, cultural modifications such as I-10 are evident but not as dominant as the urban area of Tucson.

1.7 IMPACT ANALYSIS RESULTS

1.7.1 Route Group 1: SunZia East Substation to Midpoint Substation

1.7.1.1 National Historic Trails

El Camino Real de Tierra Adentro National Historic Trail

Subroute 1A2 (BLM Preferred Alternative)

Scenic and Recreation Resources

In the southern trail study area near Elephant Butte State Park, the majority of Link A260 traverses Class C scenery associated with moderate sensitivity, while paralleling an existing 115 kV transmission line. The general form and line of the Project would replicate the existing line visually, although the scale of the facilities are different; thereby minimizing the resulting level of contrast to scenic resources that would be traversed. Low impacts to these scenic resources are anticipated because the level of change associated with the Project would be congruent with this landscape and its existing conditions. Links A161 and A161a do not parallel existing linear infrastructure; therefore, there would be a higher degree of contrast as compared to Link A260, and impacts are anticipated to be low-moderate for the Project when crossing similar scenic resources. El Contadero Mesa would not be traversed by the Project; although it occurs outside the trail study area, it was included in this assessment as a scenic resource value. Low impacts are anticipated because the Project would not cross the mesa nor would it be located in the viewshed from I-25. The BLM preferred alternative would be located west of the auto tour route and the mesa occurs on the east side of the Rio Grande.

High sensitivity lands characterized by Class C scenery are associated with lands adjacent to Fort Craig and the designated trail auto tour route along SR 1 and I-25 in the Las Cruces District Office. The majority of impacts to these scenic resources along Link A260 are anticipated to be moderate, because the Project would replicate the existing line visually as it would parallel an existing transmission line. Where visible to travel route viewers, the Project would be located within 1 to 2 miles of I-25, although the views would not be direct for the majority of the route because the Project would be located directly east of I-25. High to moderate-high impacts are anticipated where the BLM preferred alternative parallels or crosses the auto tour route, because the level of Project contrast would be stronger when viewed in the immediate foreground with minimal screening.

Impacts are anticipated to be moderate to low where the Project (a portion of links A161 and A161a) would be viewed beyond 0.5 mile from I-25 while crossing flat terrain. Views from the Fort Craig rest stop along I-25, approximately 1.5 miles from the BLM preferred alternative, would be partially backdropped by adjacent terrain, and impacts are anticipated to be low-moderate. Low impacts are anticipated for viewers associated with El Camino Real International Heritage Center and Fort Craig, because the Project would be located 4 to 6 miles from these viewers. At this distance (which is outside the trail study area), the Project would be subordinate in the landscape. Selective mitigation measure 10 (maximize structure span) would be implemented at all auto tour route crossings to reduce visual contrast.

The crossing near Socorro is specific to Subroute 1A2 and would result in impacts to portions of El Camino Real auto tour route in this northern study area, in addition to the impacts outlined for the southern study area. Portions of links E200, E180, and E133 cross Class C scenery and moderate sensitivity lands associated with the Rio Grande Valley, resulting in low-moderate impacts. The Project's visual features, mostly strong vertical and angular lines, would contrast with the landscape setting, though there are cultural modifications associated with Socorro that alter the setting.

Class A scenery and moderate sensitivity lands associated with the Rio Grande and adjacent floodplains are crossed by Link E180. Moderate-high to high impacts are anticipated at this crossing, because the Project would introduce moderate-strong forms and lines in a seemingly natural, sinuous landscape. In addition, removal of riparian vegetation would be necessary for the Project; however, selective mitigation measures 8 and 14 (avoidance and minimize right-of-way clearing) would be implemented to minimize disturbance to the extent practicable. An isolated area of high sensitivity is associated with the Quebradas Back Country Byway, which is characterized by Class C scenery, and would result in moderate impacts to these scenic resources. Link E180 also crosses SR 408 (Simulation 8), a portion of El Camino Real National Scenic Byway, where views of the Project would be skylined for travel route viewers in the immediate foreground. Impacts are anticipated to be high for viewers along this portion of the auto tour route, because Project contrast would be strong and the Project would dominate the view. Selective mitigation measure 10 (maximize structure span) would be implemented at all auto tour route crossings to reduce the visibility of the structures and reduce impacts. Westbound travel route viewers along Quebradas Back Country Byway have superior views of the Rio Grande Valley and the Project; however, the Project in this area would be located within 1.25 miles of the Byway and would be backdropped and partially screened by rolling terrain. Due to these conditions, moderate impacts are anticipated.

Historic and Cultural Resources

Class II archaeological survey conducted in support of the current study (Swanson and Rayle 2012) identified two segments of Bosquecito Road, a modern road alignment of the former Camino Real. This north-south trending alignment lies on the east terrace of the river and was recorded within both survey areas. Approximately 25 feet wide, the northern segment recorded along Subroute 1A2 (Link E180) consists of a bladed gravel road. No historic features or artifacts associated with El Camino Real were observed by the field crew within the survey area.

This recorded segment lies within a relatively rural and undeveloped setting; in this location, El Camino Real maintains its historic integrity in regards to association, location, and setting. Although modern improvements have had an impact on other aspects of the trail's historic integrity (design, materials, and workmanship), El Camino Real de Tierra Adentro NHT represents a transportation corridor that has been continuously used, altered, and improved for four centuries, and which the proposed Project has the potential to adversely impact.

At this location, the Project would not affect the ability to manage the trail, nor would it require relocation of the National Trail Management Corridor. The proposed action would, however, have a minor impact on the characteristics that make the trail worthy of designation as an NHT, but no Federal Protection Components would be affected. Moreover, no properties, including remnants and artifacts from the associated period of use that may be eligible or listed on the National Register and/or determined by the National Trail administering agency to qualify as possible high potential historic sites or high potential route segments, were identified in this area. Based on these criteria, the proposed action would have a low impact on high-sensitivity, historic segments or sites associated with El Camino Real at this location.

The NHT visual analysis for El Camino Real trail examined known trail-related cultural resources within 3 miles of the proposed alternative centerlines (Figure L-18 to Figure L-33; Table L-2). A total of 6 sites, derived from the SunZia Class I and Class II surveys, as well as information provided in the trail CMP, were identified.

Table L-2. Summary of Trail-related Cultural Resource Sites for El Camino Real de Tierra Adentro NHT			
Site Number/ Site Name	State	Site Category	Sensitivity Level
LA31745	NM	Spanish-contact era mission	3
LA283	NM	Spanish-contact era native village/habitation	3
LA31746	NM	Spanish-contact era native village/habitation	3
LA31751	NM	Spanish-contact era native village/habitation	3
Fort Craig National Historic Site	NM	Historic fort	3
El Contadero Mesa	NM	Cultural landscape/parajes	3

Biological, Natural, and Other Resources

The BLM preferred alternative does not traverse any CMP identified unique biological, natural, or other resources in the southern study area; thus impacts are anticipated to be low. Low impacts to biological or natural resources associated with the trail are anticipated where the BLM preferred alternative would minimize access road disturbance by paralleling an existing utility corridor in the southern study area (Link A260). For the northern study area, the crossing of the Rio Grande near Socorro would result in high impacts to riparian and cottonwood gallery forest

communities where bird habitat conservation areas are delineated. Although the majority of the Rio Grande floodplain in Socorro is primarily converted into agricultural lands, resulting in low impacts to biological or natural resources associated with the trail, remnants of these riparian communities remain along the banks of the Rio Grande that would be affected by the Project. Where the Project would introduce new access along links E200, E180, and E133 in desert scrub vegetation, impacts are anticipated to be low-moderate because of new access and associated disturbance to native vegetation and habitat areas. Selective mitigation measures 8 and 14 would be implemented to avoid riparian vegetation and/or minimize removal, to the extent practicable.

Subroutes 1A and 1A1 – North River Crossing

Subroutes 1A and 1A1 would have similar impacts for all resources, qualities, values, and associated setting(s) as described for the BLM preferred alternative, for all but Link A260. Subroutes 1A and 1A1 include Link A270, which is west of I-25 at the foothills of the San Mateo Mountains. Link A270 traverses Class C scenery associated with high sensitivity where the introduction of the Project's facilities would result in moderate impacts for these scenic resources. The auto tour route, which Link A270 roughly parallels and crosses, is anticipated to have impacts to travel route viewers. The Project would be viewed in the immediate foreground distance zone (within 0.5 mile), while parallel to this travel route for approximately 8 miles, dominating the landscape setting. Cultural modifications to this portion of the study area are limited to I-25, and would also be visible to viewers along the auto tour route (SR 1); however, impacts would be greater than the BLM preferred alternative because the Project would not parallel existing utilities with similar line, form, color, and texture.

Subroutes 1B – San Antonio River Crossing

The crossing near San Antonio is specific to Subroute 1B and would result in impacts to portions of El Camino Real auto tour route in this study area, in addition to impacts in the southern study area for the BLM preferred alternative (links A161 and A161a). Portions of links A143 and A140 cross Class C scenery associated with moderate to high sensitivity in the Rio Grande Valley. High to moderate-high impacts are anticipated, because the Project would not parallel an existing utility, although there are cultural modifications in this landscape associated with San Antonio that modify the setting. Class A scenery associated with the Rio Grande and adjacent floodplains are crossed by Link A140. High to moderate-high impacts are anticipated at this crossing because the Project would not parallel an existing linear facility, and contrast would not be reduced. Removal of riparian vegetation would be necessary for the Project. Selective mitigation measures 8 and 14 would be implemented to minimize disturbance to the extent practicable.

Link A140 also crosses SR 1, a portion of the designated auto tour route that comes out of the Bosque del Apache, where views of the Project would be unobstructed in the immediate foreground. Impacts are anticipated to be high for viewers along this portion of the auto tour route because project contrast would be strong, although viewed in the context of existing cultural modifications in San Antonio that modify the setting. Mitigation measure 10 (maximize structure span) would be implemented at all auto tour route crossings to reduce visual contrast.

Subroute 1B would have similar impacts to inventoried resources, qualities, values, and associated setting(s) of the historic trail as subroutes 1A and 1A1 in the southern study area.

Route Group 1 Summary

The BLM preferred alternative for Route Group 1 would result in low-moderate to high impacts to inventoried resources, qualities, values, and associated setting(s) of the historic trail. An isolated portion of Link E180 would result in high impacts to scenic resources, primarily associated with crossing the Rio Grande, which is inventoried as Class A scenic quality. In addition, moderate to localized areas of high impacts on views from the designated auto tour route, a recreation resource and interpretive opportunity for the historic trail, are anticipated. High impacts would be limited to where the auto tour route would be crossed or paralleled by the Project's features, predominantly the transmission line towers. Overall, based on the results of the resource impact assessment, Subroute 1A2 would affect the intended experience of the trail but would not substantially compromise the trail itself, resulting in moderate impacts for the Nature and Purpose for the following reasons:

- Moderate-high impacts to viewers along the auto tour route would occur for a short viewing duration, but would be backdropped by adjacent terrain. Generally, the Project would appear co-dominant in relation to the landscape setting.
- The construction, operation, and maintenance of the Project would not preclude use or enjoyment because it would span the trail at all crossings. Selective mitigation measures, to be identified in the final POD, would be implemented to reduce impacts where feasible.
- High potential sites and segments were not identified in the trail study areas per the CMP for El Camino Real de Tierra Adentro. The proposed action would not limit the agency's ability to manage the trail for the protection and preservation of the historic route, and its historic remnants and artifacts for public use and enjoyment.
- The auto tour route is the primary recreation resource associated with this NHT. The stated use of the route is to "provide the public with opportunities for compatible recreation activities." The Project would not result in effects that would inhibit recreation activities.

1.7.1.2 National Scenic Trails

There are no NSTs within the SunZia Project study area for Route Group 1.

1.7.1.3 Trails Recommended as Suitable for National Trail Designation

Butterfield Overland Mail and Stage Route (Historic)

Subroute 1A2 (BLM Preferred Alternative)

Scenic and Recreation Resources

Near the Midpoint Substation study area, Link A440 traverses Class C scenery associated with high to moderate sensitivity while parallel to a 115 kV transmission line, a 345 kV transmission line, and a state highway. Although the scale of the facilities is different, the Project would replicate these existing visual features, thereby reducing the level of contrast. High sensitivity is associated with Cooke's Range landscape to the west of SR 26 and would result in low-moderate impacts to these scenic resources within the trail study area. Moderate sensitivity is associated with the foothills of the Goodsight mountains and valley plains to the east, and would result in low impacts to these scenic resources for a small portion of the BLM preferred alternative within the trail study area. Travel route viewers along SR 26 where the Butterfield Overland Mail and Stage Route crosses the highway would have direct and unobstructed views of the Project in the immediate foreground; however, it would be viewed in context with the existing utility corridor, resulting in low-moderate impacts. Since there are no known recreation values associated with the Butterfield Trail, impacts are not anticipated.

Historic and Cultural Resources

Class II archaeological survey conducted in support of the current study (Swanson and Rayle 2012) identified a segment of the Butterfield Trail (LA 173985) along the preferred alternative (Subroute 1A2; Link A440) where five visible trail segments were identified as ephemeral tracks. The NHT visual analysis for the Butterfield trail examined known trail-related cultural resources within 3 miles of the proposed alternative centerlines (Figure L-18 to Figure L-33; Table L-3). A total of 14 sites derived from the SunZia Class I and Class II data were identified.

Table L-3. Summary of Trail-related Cultural Resource Sites for Butterfield Trail			
Site Number/ Site Name	State	Site Category	Sensitivity Level
AZ AA:12:54(ASM) Point of Mountain Stage Station	AZ	Stage stop and outbuilding	3
AZ BB:14:498(ASM) Cienega Stage Station	AZ	Stage stop and outbuilding	3
AZ BB:14:673(ASM) Old Pantano Road	AZ	Historic road/trail segment	2
AZ T:14:61(ASM)	AZ	Historic road/trail segment	3
LA49992 Shakespeare	NM	Historic Mining Town	3

Table L-3. Summary of Trail-related Cultural Resource Sites for Butterfield Trail			
Site Number/ Site Name	State	Site Category	Sensitivity Level
LA12834	NM	Historic road/trail segment	3
LA38494	NM	Historic road/trail segment	3
LA117321	NM	Historic road/trail segment	3
LA5759	NM	Stage stop and outbuilding	3
LA173985	NM	Historic road/trail segment	2
LA173986	NM	Historic road/trail segment	3
LA173987	NM	Historic road/trail segment	2
LA173988	NM	Historic road/trail segment	2
LA173989	NM	Historic road/trail segment	2

This survey also identified a number of historic artifacts in association with the trail that are consistent with mid- to late-nineteenth century use of the trail. The extant tracks in this area have interpretive potential. This recorded segment lies within a rural, undeveloped setting approximately 5 miles east of Cooke's Range and the historic Fort Cummings. In this location, the Butterfield Trail maintains its historic integrity in regards to association, location, and setting. Although an existing transmission line supported on tall wooden H-structures parallels US 26 and the Atchison, Topeka, & Santa Fe Railroad, additional power lines would contribute to the already compromised visual integrity in this location. The proposed action would adversely impact the Butterfield Trail at this location.

The proposed action at this location would not affect the ability to manage the trail if designated an NHT, nor would it require relocation of a National Trail Management Corridor. The proposed action would have a minor impact on the characteristics that make the trail worthy of designation as an NHT. Likewise, the proposed action could have a minor impact on potential Federal Protection Components, including high potential route segments located on public land, as well as to potential NHT properties, including remnants and artifacts from the associated period of use that may be eligible for or listed on the National Register to qualify as possible high potential historic sites or high potential route segments. The proposed action would not limit the agency's ability to manage the trail for the purpose of identifying and protecting the historic route and its historic remnants and artifacts for public use and enjoyment. Based on these criteria, the proposed action would have a low impact on high-sensitivity, historic segments or sites associated with the Butterfield Trail at this location.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area. Impacts to ground disturbance can be minimized where the BLM preferred alternative would parallel an existing utility corridor (Link A440).

Subroute 1A and Subroute 1B

For the Butterfield Trail study area near the Midpoint Substation, subroutes 1A and 1B would have similar impacts to resources, qualities, values, and associated setting(s) as described for the BLM preferred alternative along Link A440.

Local Alternative Links A430 and A481

Scenic and Recreation Resources

Near the Midpoint Substation study area, links A430 and A481 traverse Class B scenery associated with low sensitivity in a landscape with few modifications that are limited to ranching, unpaved roads, and rural residences. Moderate impacts are anticipated because the Project's visual features would introduce strong vertical and angular lines that would contrast with the landscape setting.

Historic and Cultural Resources

The Class II survey identified a number of historic artifacts in association with the trail that are consistent with mid- to late-nineteenth century use. The extant tracks in this area have interpretive potential. This recorded segment lies within a rural, undeveloped setting approximately 5 miles east of Cooke's Range and historic Fort Cummings. In this location, the Butterfield Trail maintains its historic integrity in regards to association, location, and setting. The local alternative links would adversely impact the Butterfield Trail at this location.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low-moderate for these local alternative links, because there are no identified biological, geological, and scientific resources for the trail study area. The introduction of the Project along these links would introduce new access that would result in higher impacts to biological resources than the BLM preferred alternative.

Route Group 1 Summary

The BLM preferred alternative for Route Group 1 would result in low to low-moderate impacts to inventoried resources, values, and settings of the Butterfield Overland Mail and Stage Route. The majority of the Project would parallel and be viewed in context with several existing transmission lines along SR 26. Overall, based on the results of the impact assessment, Subroute 1A2 would not substantially compromise the trail's values, characteristics, and settings.

1.7.2 Route Group 3: Midpoint Substation to Willow-500 kV Substation

1.7.2.1 National Historic Trails

There are no NHTs within the SunZia Project study area for Route Group 3.

1.7.2.2 National Scenic Trails

Continental Divide National Scenic Trail

Subroute 3A2 – BLM Preferred Alternative

Scenic and Recreation Resources

The majority of Subroute 3A2 crosses Class C scenery associated with low sensitivity for the Lordsburg Valley landscape while parallel to existing transmission lines. Although the scale of the facilities is different, the general form and line of the Project would replicate the visual existing line, thereby reducing the level of contrast to the scenic resources that would be traversed. Because the level of change associated with the Project would generally be congruent with the landscape and its existing conditions, low impacts are anticipated. For the majority of Subroute 3A2, trail users would view the Project in context with an existing substation, an existing 345 kV transmission line, and multiple 115 kV lines converging at the substation (Link B121); therefore, the level of contrast would be reduced and would result in moderate to low impacts. At the trail crossing, impacts are anticipated to be moderate-high because the Project would be co-dominant in the landscape setting, although viewing duration would be moderate for trail users. As Subroute 3A2 continues west from the Hidalgo Substation, the CDNST would be roughly paralleled by the Project for 3 miles; however, recreation users would view the Project looking through the existing utility corridor. Moderate impacts are anticipated where the Project would be viewed in this context at a distance of 0.75 mile. Mitigation measure 10 (maximize structure span), would be implemented at the crossing of the trail to reduce visibility of the structures and would reduce impacts. Potential impacts associated with OHV use would be mitigated by selective mitigation measure 6 (limiting access), which would require access road closure near the trail to prevent unauthorized OHV access. Impacts are anticipated to be low for travel route viewers along SR 90, a resource value for the trail near the junction of SR 90 and SR 70, where the Project may be visible within 4 miles but viewed in context with the existing utility corridor.

Historic and Cultural Resources

There are no identified historic or cultural resources associated with the trail where the BLM preferred alternative crosses the CDNST.

Biological, Natural, and Other Resources

The majority of impacts to biological or natural resources associated with the trail are anticipated to be low for Subroute 3A2, because there are no identified biological, geological, and scientific resources for the trail study area. Impacts to ground disturbance can be minimized where the BLM preferred alternative would parallel an existing utility corridor (links B120b and B121).

Subroute 3A – North

Subroute 3A would have similar impacts as described for the BLM preferred alternative.

Subroute 3B – South

Scenic and Recreation Resources

Subroute 3B traverses Class B scenery associated with the Pyramid Mountains and Class C scenery associated with the Lordsburg Valley, which are also classified as high sensitivity landscapes because of the scenic trail. Impacts to these scenic resources are anticipated to be moderate-high to high where the Project would cross rolling terrain to steep terrain associated with Class B scenery. Moderate impacts are anticipated for portions of the Project traversing these scenic resources when crossing several existing utilities, such as pipelines and major transportation routes, where the landscape has been modified or occurs within Class C scenery. Impacts to viewers along the CDNST are anticipated to be high where the Project would cross or be viewed within the immediate foreground distance zone (approximately 0.5 mile), primarily because the Project's features would introduce strong vertical and angular lines and would contrast with the landscape setting. Mitigation measure 10 (maximize structure span) would be implemented at the trail crossing to reduce visibility of the structures in order to reduce impacts. Impacts are anticipated to be moderate-high for travel route viewers along SR 494 and Animas Street. Although utilities and other cultural modifications are evident in the southern trail study area, including residential, commercial, and industrial development, Link B112 would have higher visual contrast than the BLM preferred alternative; thus resulting in higher impacts to scenic and recreation resources.

Historic and Cultural Resources

There are no identified historic or cultural resources associated with the trail where Subroute 3B crosses the CDNST.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low for Subroute 3B, because there are no identified biological, geological, and scientific resources for the trail study area.

Crossover Links B111 and B140

Crossover Link B140 does not cross the CDNST, nor does it occur within the trail study area; therefore, impacts are not anticipated for trail resources, qualities, values, and associated settings. Crossover Link B111 occurs within the trail study area and would have impacts similar to the BLM preferred alternative, because it would parallel an existing transmission line corridor.

Route Group 3 Summary

The BLM preferred alternative for Route Group 3 would result in low to moderate-high impacts to inventoried resources, qualities, values, and associated settings of the scenic trail. An isolated portion of the BLM preferred alternative would result in moderate-high impacts where the scenic trail would be crossed by the Project, but would be viewed in the context of several existing utilities and a substation, thus reducing Project contrast. Based on the results of the resource

impact assessment, Subroute 3A2 would affect the intended experience of the trail but would not substantially compromise the trail, resulting in moderate impacts for the nature and purpose for the following reasons:

- Moderate-high impacts to viewers along the trail would occur for a moderate viewing duration, and would be viewed in context with several existing transmission lines and a substation. Overall, the Project would be co-dominant in the landscape setting.
- The Continental Divide Trail is a recreation and conservation corridor that “provide[s] high quality scenic, primitive hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor.” The trail study area north of Lordsburg is associated with utility development and is not reflective of a scenic or primitive hiking experience in terms of landscape setting. It is anticipated that primitive hiking or horseback riding recreation settings would not be substantially degraded as a result of the Project.
- The construction, operation, and maintenance of the Project would not substantially interfere with the use and enjoyment of the CDNST at this location. Selective mitigation measures would be implemented, as identified in the final POD, to reduce impacts where feasible.
- The proposed action would not limit the agency’s ability to manage the trail for the protection and conservation of natural, historic, and cultural resources, because these resources would not be substantially impacted by the BLM preferred alternative.

1.7.2.3 Trails Recommended as Suitable for National Trail Designation

Butterfield Overland Mail and Stage Route (Historic)

Subroute 3A2 – BLM Preferred Alternative

Scenic and Recreation Resources

The majority of Subroute 3A2 in the Lordsburg study area crosses through Class C scenery associated with low sensitivity lands in the Lordsburg Valley. Low impacts are anticipated for portions of the Project crossing these scenic resources when parallel to or crossing transmission lines or other linear utilities. Although the scale of the facilities is different, the form and line of the Project would replicate the existing transmission lines, thereby reducing the level of contrast. A small portion of Class B scenery associated with the Lordsburg Mesa would be crossed by Subroute 3A2, resulting in moderate to moderate-high impacts because the route would deviate slightly from the utility corridor while crossing rolling to steep terrain. Since there are no known recreation values associated with the Butterfield Trail, impacts are not anticipated.

Historic and Cultural Resources

Class II archaeological survey conducted in support of the current study (Swanson and Rayle 2012) identified a segment (see Table 3) of the Butterfield Trail along Subroute 3A2 (Link 120b). Although no tracks are visible, 11 historic artifacts and 5 cairns were recorded along the trail. It is likely that the cairns served as trail markers to guide stagecoach drivers in areas where

physical traces of wagon/coach passage did not leave visible evidence, or where these were obscured soon after passage. Although the trail lacks physical traces of the roadway, the historic artifacts and cairns closely align with the projected path of the Butterfield Trail. This recorded segment lies within a rural, undeveloped setting along the south side of the Langford Mountains, and in this location, the trail maintains its historic integrity in regards to association, location, and setting. Selection of a route using Link B120b would adversely impact the Butterfield Trail.

The BLM preferred alternative and other links associated with Route Group 3 would not affect the ability to manage the trail if designated an NHT, nor would it require relocation of National Trail Management Corridors. The proposed action would have a minor impact on the characteristics that make the trail worthy of designation as an NHT. Likewise, the proposed action could have a minor impact on potential Federal Protection Components, including high potential route segments located on public land, as well as to potential NHT properties, including remnants and artifacts from the associated period of use that may be eligible or listed on the National Register to qualify as possible high potential historic sites or high potential route segments. The proposed action would not limit the agency's ability to manage the trail for the purpose of identifying and protecting the historic route and its historic remnants and artifacts for public use and enjoyment. Based on these criteria, the proposed action would have a low impact on the Butterfield Trail at these locations.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low-moderate to low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area. Impacts to ground disturbance can be minimized where the BLM preferred alternative would parallel an existing utility corridor (links B120b and B121).

Subroute 3A – North

For the Butterfield Trail study area near Lordsburg, Subroute 3A would have similar impacts as described for the BLM preferred alternative.

Subroute 3B – South

Scenic and Recreation Resources

Subroute 3B traverses Class B scenery associated with high sensitivity lands near the Pyramid Mountains, Peloncillo Mountains, and adjacent San Simon Valley. Impacts to these resources are anticipated to be moderate to moderate-high where the Project would cross rolling to steep terrain of the Pyramid and Peloncillo mountains foothills. Low-moderate impacts are anticipated for portions of the Project crossing Class C scenery associated with high sensitivity of the I-10 corridor while parallel to or crossing several existing utilities, such as pipelines and major transportation routes, where the landscape has been heavily modified. Since there are no known recreation values associated with the Butterfield Trail, impacts are not anticipated.

Historic and Cultural Resources

Survey along Subroute 3B (Link B150a) (Swanson and Rayle 2012) identified a segment of the Butterfield Trail (AZ T:14:61[ASM]) that coincides with the modern Doubtful Canyon Road (see Table 3). An east-west trending access road for a pipeline intersects the Butterfield Trail, but does not introduce a significant visual impact, and the trail retains integrity of location, setting, feeling, and association. This segment of the Butterfield Trail contributes to the overall site eligibility, and the selection of Link B150a would have an adverse impact. This segment lies within a rural, undeveloped setting approximately 4.0 miles southwest of Stein's Peak near Roostercomb Mountain, and in this location, the trail maintains its historic integrity in regards to association, location, and setting. Selection of Link B150a would have an adverse effect on its historic integrity.

Biological, Natural, and Other Resources

Impacts to biological or natural associated with the trail are anticipated to be low-moderate to low for Subroute 3B, because there are no identified biological, geological, and scientific resources for the trail study area.

Crossover Links B111 and B140

Scenic and Recreation Resources

The majority of the Butterfield Trail in the Lordsburg study area crosses through the Lordsburg Valley, which is characterized by Class C scenery and high sensitivity lands associated with I-10 and the scenic trail. Low-moderate impacts are anticipated along Link B111 where these scenic resources would be crossed when parallel to an existing 115 kV transmission line. Although the scale of the facilities is different, the general form and line of the Project would replicate the existing line visually, thereby reducing the level of contrast to this landscape. Link B140 crosses Class C scenery but does not parallel an existing linear facility; thus impacts are anticipated to be moderate, because Project contrast would be stronger where strong form and angular lines would be introduced. Since there are no known recreation values associated with the Butterfield Trail, impacts are not anticipated.

Historic and Cultural Resources

Survey along crossover links B111 and B140 (Swanson and Rayle 2012) identified two segments (see Table 3) of the Butterfield Trail (LA 173988 and LA 173989). At LA 173988, historic artifacts were identified but no physical traces of the road remain. Although the distribution of artifacts within the area closely aligns with the projected path for the Butterfield Trail, the trail lacks historic integrity, and selection of Link B111 would not adversely impact the trail. Physical traces of the trail are not visible at LA 173989; however, rock cairns and historic artifacts dating to the mid-nineteenth to early-twentieth century were recorded within 30 meters of the projected trail corridor. It is likely that the cairns served as trail markers to guide stagecoach drivers in areas where physical traces of wagon/coach passage did not leave visible evidence, or where these were obscured soon after passage. The LA 173989 segment lies within a rural, undeveloped setting approximately 5.0 miles west of Lordsburg and 1.5 miles north of I-10; in

this location, the trail maintains its historic integrity in regards to association, location, and setting. Selection of Link B140 would have an adverse effect on its historic integrity.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low-moderate to low for these crossover links, because there are no identified biological, geological, and scientific resources for the trail study area.

Route Group 3 Summary

The BLM preferred alternative for Route Group 3 would result in low impacts to inventoried resources, values, and settings of the Butterfield Overland Mail and Stage Route. The majority of the Project would parallel or be viewed in context with several existing transmission lines and the Hidalgo Substation. Overall, based on the results of the impact assessment, Subroute 3A2 would not substantially compromise the trails' values, characteristics, and settings.

1.7.3 Route Group 4: Willow 500 kV Substation to Pinal Central Substation

1.7.3.1 National Historic Trails

Juan Bautista de Anza National Historic Trail

Subroute 4C2c – BLM Preferred Alternative

Scenic and Recreation Resources

The majority of the Anza Trail study area traverses developed land associated with agriculture. A small portion of Subroute 4C2c crosses Class C scenery and low sensitivity undeveloped land near the Picacho Reservoir. Impacts are anticipated to be low due to existing cultural modifications and the presence of similar utility infrastructure. The designated auto tour route is associated with SR 87, which would be crossed by the BLM preferred alternative. Impacts are anticipated to be moderate because the landscape setting is primarily developed by agriculture and high-voltage transmission lines where the Project would replicate the visual form and line of these facilities, thereby reducing the level of contrast. In addition, the BLM preferred alternative crosses SR 87 approximately 0.25 mile south of an existing 500 kV transmission line of a similar scale that would reduce contrast. Mitigation measure 10 (maximize structure span) would be implemented at this crossing to reduce visual contrast.

Historic and Cultural Resources

Subroute 4C2c crosses a small portion of the Juan Bautista de Anza National Historic Trail near the Pinal Central Substation. No high potential sites or segments of the Anza Trail have been identified for the BLM preferred alternative. The NHT visual analysis for the Anza Trail examined known trail-related cultural resources within 3 miles of the proposed alternative centerlines (Figure L-18 to Figure L-33; Table L-4). A total of 2 sites were identified, derived

from the SunZia Class I and Class II surveys, as well as from information provided in the trail CMP.

Table L-4. Summary of Trail-related Cultural Resource Sites for Juan Bautista de Anza NHT			
Site Number/ Site Name	State	Site Category	Sensitivity Level
Expedition Camp #18 Pueblo de Tuquison	AZ	Historic campsite	3
Expedition Camp #19 Puerto del Azotado	AZ	Historic campsite/prehistoric archaeological site	3
Presidio San Agustín del Tucson	AZ	Historic Mission	3
Mission San Agustín del Tucson	AZ	Historic mission	3

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area.

Subroute 4A – North of Mt. Graham

For the Anza Trail study area near the Pinal Substation, Subroute 4A would have similar impacts to resources, qualities, values, and associated settings as described for the BLM preferred alternative.

Subroute 4B – Sulphur Springs Valley

For the Anza Trail study area near the Pinal Substation, Subroute 4B would have similar impacts to resources, qualities, values, and associated settings as described for the BLM preferred alternative.

Subroute 4C1 – East of San Pedro River

For the Anza Trail study area near the Pinal Substation, Subroute 4C1 would have similar impacts to resources, qualities, values, and associated settings as described for the BLM preferred alternative.

Subroute 4C2 – West of San Pedro River

For the Anza Trail study area near the Pinal Substation, Subroute 4C2 would have similar impacts to resources, qualities, values, and associated settings as described for the BLM preferred alternative.

Subroute 4C3 – Tucson

Scenic and Recreation Resources

For the Anza Trail study area the landscape setting has been heavily modified by development associated with the Tucson metropolitan area (links F111, F112, and F510). This subroute parallels existing transmission lines (138 kV and 115 kV), travel routes including I-10, railroad corridors, and pipeline routes within the developed area. The level of visual contrast introduced by the Project would be low in these highly developed areas.

Travel route viewers associated with the designated auto tour route along I-10 may have views of the Project; however, portions of it would be viewed in context with the developed area of Tucson as well as transmission lines immediately adjacent to the Project. Impacts are anticipated to be low-moderate for viewers along the auto tour route where views of the adjacent development are dominant. Santa Cruz River Parkway is a developed recreational trail along the Santa Cruz River that parallels the historic trail. This river corridor is highly channelized through the Tucson metropolitan area, and paved trails (the Anza Recreation Trail) for recreation are established. Existing transmission line facilities have been located within portions of this corridor and the Project would parallel these utilities with similar form and line, although smaller in scale than the Project. Overall, the majority of impacts to recreation viewers along this segment of the historic Anza Trail would be moderate to moderate-high, due to the existing modifications that co-dominate the setting, yet would be viewed in the immediate foreground (within 1/8 mile). The high-potential sites associated with interpretive facilities (including a new trailhead facility) within Christopher Columbus Park are also adjacent to development in Tucson and include multiple transmission lines, I-10, and a water treatment plant. The CMP recognizes that many portions of the Anza Trail pass through urban areas where the landscape setting has been highly modified. Impacts to these interpretive sites are anticipated to be low-moderate, because the existing setting has been highly modified with urban/suburban type development. As Subroute 4C3 continues north from Tucson toward the Tortolita Substation, the Project would roughly parallel the I-10 corridor, crossing Class B scenery associated with moderate sensitivity. Impacts are anticipated to be high to low-moderate respectively for these scenic resources and recreation viewers associated with the trail, because the Project would either traverse more natural landscapes or parallel an existing 138 kV transmission line. Impacts to viewers along the auto tour route (I-10) would have low impacts, because the Project would be located within 2 miles of these viewers and viewed in context with an existing transmission line with similar form, line, and color.

Historic and Cultural Resources

Four NPS-designated high-potential sites (Mission San Agustín del Tucson, Presidio San Agustín del Tucson, Expedition Camp #18 [Pueblo de Tuquison], and Expedition Camp #19 [Puerto del Azotado]/Los Morteros Archaeological Site) associated with the trail occur along Subroute 4C3 (Link F112 and Link F510). Expedition Camp #18 (Pueblo de Tuquison) represents a temporary campsite used during the 1775 Anza expedition¹. No known physical remains associated with the Anza Trail occur at this location; however, interpretive signage

¹ <http://www.pima.gov/areainfo/anza/Tuquison.html>

designates the location as the site of a temporary encampment associated with the 1775 expedition. This area lies within the bounds of Christopher Columbus Park in Tucson, approximately 200 meters east of the proposed alternative, in a built environment just west of the I-10 corridor, which includes several transmission lines, a man-made lake, a new trailhead facility, a sewage treatment plant, remote-controlled model airplane runways, and access roads.

Expedition Camp #19 (Puerto del Azotado) and Los Morteros Archaeological Site (AZ AA:12:27[ASM]) lies at the extreme north end of the Tucson Mountains near the Santa Cruz River. Los Morteros is a large Hohokam village site named for the bedrock mortars found near its center. The Anza expedition campsite, Puerto del Azotado, was in the vicinity of Los Morteros. The site was considered in the Saguaro National Monument Boundary study. It was recommended but not approved for a level of designation (evaluated through the national landmark nomination and designation process) that would ensure adequate resource protection and interpretation.

The Mission San Agustín lies on the western side of the Santa Cruz River, across the river from modern downtown Tucson. This location had long been occupied by a succession of people, including the Archaic, Hohokam, and Piman. The Spanish developed a substantial mission complex on the site of a Piman village. Because foundation walls and other signs of past occupation remain intact within the subsurface of the site, there are plans to develop a cultural park that would focus the public on interpretation of the many cultures.

The Presidio San Agustín del Tucson, which is a contributing property of the downtown Tucson Presidio Historic District (AZ BB:13:81[ASM]), lies on the eastern side of the Santa Cruz River. The presidio was founded in August 1775 to replace the Tubac Presidio as the main Spanish defense of the region. When Anza's expedition passed through in the area, the presidio had been planned but not constructed. Plaques on city streets mark the location of several corners of the old structure, and a citizen's group would like to re-create part of the presidio in downtown Tucson.

The Project at Link F112 and Link F510 would not affect the ability to manage the NHT, nor would it require relocation of the National Trail Management Corridor. The proposed action would have a minor impact on the characteristics that make the trail worthy of designation as an NHT. The proposed action would not impact any potential Federal Protection Components, including high potential route segments located on public land, nor would it impact potential NHT properties, including remnants and artifacts from the associated period of use that may be eligible or listed on the National Register to qualify as possible high potential historic sites or high potential route segments. Further, the proposed action would not limit the agency's ability to manage the trail for the purpose of identifying and protecting the historic route and its historic remnants and artifacts for public use and enjoyment. Based on these criteria, the Project would have a low impact on the Anza Trail at these locations.

Biological, Natural, and Other Resources

The majority of the Santa Cruz River through Tucson has been channelized, and native riparian vegetation is marginal. Impacts to biological or natural resources associated with the trail are

anticipated to be low for Subroute 4C3, because there are no identified biological, geological, and scientific resources for the trail study area.

Route Group 4 Summary

The BLM preferred alternative for Route Group 4 would result in low impacts to inventoried resources, qualities, values, and associated settings of the Juan Bautista de Anza National Historic Trail. The majority of the trail study area is associated with agriculture developed near the Pinal Central Substation, and the Project would parallel or be viewed in context with several existing transmission lines. In addition, the designated auto tour route, a recreation resource and high potential interpretive opportunity for the historic trail, is anticipated to have low impacts to trail users because the Project would parallel an existing 500 kV transmission line while crossing this travel route. Overall, based on the results of the impact assessment, Subroute 4C2c would have a negligible effect on the intended experience of the trail, resulting in low impacts for the nature and purpose for the following reasons:

- Views of the Project from the auto tour route would be limited to short occurrences and would be in context with several existing transmission lines and a substation. Overall, the Project would be subordinate in the context of the existing conditions.
- The construction, operation, and maintenance of the Project would not preclude use or enjoyment because it would span the trail and auto tour route at all crossings.
- High potential sites and segments were not identified in the trail study area for the BLM preferred alternative. The Project would not limit the agency's ability to manage the trail for the protection and preservation of the historic route, and its historic remnants and artifacts for public use and enjoyment.
- Within the study area for the BLM preferred alternative, the auto tour route is the primary recreation resource associated with the NT. The stated use of the route is to "provide the public with opportunities for compatible recreation activities." The Project would not result in effects that would inhibit recreation activities.

1.7.3.2 National Scenic Trails

Arizona National Scenic Trail

Subroute 4C2c – BLM Preferred Alternative

Scenic and Recreation Resources

The BLM preferred alternative traverses Class B scenery and high sensitivity lands associated with the foothills of the Black Hills. Impacts to these scenic resources are anticipated to be high to moderate-high, because the Project would not parallel existing linear features, thereby resulting in strong contrast through the introduction of strong vertical and angular lines. There are few other recreation points of interest along this segment of the trail between Freeman Road Trailhead and Tiger Mine Trailhead. South of Tiger Mine Trailhead, other recreation opportunities are associated with Oracle State Park and Coronado National Forest. The Tiger

Mine Trailhead is approximately 0.5 mile south of Link C670 and impacts are anticipated to be high, because strong Project contrast would be unobstructed for recreation viewers at the trailhead. Although portions of the Project may be partially skylined, overall it would dominate the landscape setting for viewers associated with a moderate viewing duration within the foreground distance zone. Impacts are also anticipated to be high where the Project crosses the trail, because strong visual contrast would be unobstructed for recreation viewers. At this trail crossing, the Project would dominate the landscape setting because there are few other linear features or cultural modifications in this area. SR 77 and Tiger Mine Road are identified as resource values for the Arizona trail because it provides access to the trail and trailhead. Impacts are anticipated to be moderate-high where the Project would cross these resource values for the trail, because the Project would be viewed in the foreground distance zone with minimal screening. Moderate impacts are anticipated where the Project would be viewed within the foreground distance but not be crossed by the Project. Project contrast would be strong and dominate the landscape for recreation viewers. Mitigation measure 10 (maximize structure span) would be implemented at the ANST and road crossings to reduce visibility of the structures for these recreation resources.

Historic and Cultural Resources

There are no known historic or cultural resources associated with the ANST, because the trail was constructed to avoid these sensitive resources; therefore, impacts are not anticipated. Because cultural resources have not been fully inventoried within the trail corridor, resources near the trail could be affected by the Project; however, none are currently known.

Biological, Natural, and Other Resources

Impacts to biological or natural resources are anticipated to be low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area.

Subroute 4A – North of Mt. Graham

Scenic and Recreation Resources

Subroute 4A traverses Class B scenery associated with the foothills of the Black Hills. Lands in this study area are primarily associated with high sensitivity along the ANST and there are few other recreation points of interest along this segment of the trail. Impacts to scenery and high sensitivity lands are anticipated to be moderate to moderate-high respectively because the Project would not parallel existing linear features resulting in strong contrast through the introduction of strong vertical and angular lines. The Freeman Road Trailhead is approximately 4.75 miles north of Link C620 and impacts are anticipated to be low because the Project, if visible, would be subordinate to recreation viewers at the trailhead. Impacts are anticipated to be high where the Project crosses the trail because views of strong contrast would be unobstructed for recreation viewers. The Project would dominate the landscape setting because there are few other linear features or cultural modifications in this area. Mitigation measure 10 (maximize structure span) would be implemented at this crossing to reduce visibility of these structures.

Historic and Cultural Resources

There are no known historic or cultural resources associated with the ANST, because the trail was constructed to avoid these sensitive resources; therefore, impacts are not anticipated. Because cultural resources have not been fully inventoried within the trail corridor, resources near the trail could be affected by the Project; however, none are currently known.

Biological, Natural, and Other Resources

Impacts to biological or natural resources are anticipated to be low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area.

Subroute 4B – Sulphur Springs Valley

Subroute 4B would have similar impacts as described for Subroute 4A.

Subroute 4C1 – East of San Pedro River

Subroute 4C1 would have similar impacts as described for the BLM preferred alternative.

Subroute 4C2– West of San Pedro River

Subroute 4C2 would have similar impacts as described for the BLM preferred alternative.

Subroute 4C3 – Tucson

Scenic and Recreation Resources

Subroute 4C3 traverses Class B scenery and high sensitivity landscapes associated with bajadas and foothills of the Rincon and Empire Mountain Ranges. Impacts to these scenic resources are anticipated to be low where the Project would parallel several existing transmission lines south of I-10. Although the scale may be different, the Project would visually replicate the existing transmission lines in these locations, and the overall resulting contrast would be reduced. Moderate impacts are anticipated where the Project would require new access and would introduce strong vertical and angular lines that would contrast with the landscape setting. At the crossing of the ANST, the Project would parallel an existing 345 kV, 230 kV, 138 kV, and 115 kV transmission line corridor that is approximately 0.5 mile wide. Impacts to recreation viewers at the trail crossing are anticipated to be low-moderate, because the existing transmission lines would have similar line, form, color, and texture as the proposed Project, thereby reducing visual contrast. Other recreation values include some travel routes that may provide user access to trailhead locations. For Link F600, these include Old Sonoita Highway, SR 83, and I-10, which are major travel routes in this area. Although Link F600 does not cross Old Sonoita Highway or SR 83, views of the Project would occur within 0.5 to 1 mile for a short duration; thus impacts are anticipated to be moderate-high where viewed in a natural setting with few modifications. Moderate-high impacts are anticipated along Link F600 where it crosses I-10, because the

Project would not parallel existing linear facilities and would result in stronger visual contrast. Mitigation measure 10 (maximize structure span) would be implemented at this crossing to reduce visibility of the structures and would reduce impacts.

Historic and Cultural Resources

There are no known historic or cultural resources associated with the ANST, because the trail was constructed to avoid these sensitive resources; therefore, impacts are not anticipated. Because cultural resources have not been fully inventoried within the trail corridor, resources near the trail could be affected by the Project; however, none are currently known.

Biological, Natural, and Other Resources

Roughly parallel to the ANST, Davidson Canyon is an ephemeral wash and identified Pima County Biological Core Area that is crossed by Link F600. Impacts are anticipated to be high for this resource (see Section 4.6 – Biological Resources), because the Project would span this canyon and would reduce disturbance within this resource value. Existing disturbance may be associated with other transmission lines that span this canyon.

Local Alternative Links F40a, F40b, F51, F60a, F60b

Scenic and Recreation Resources

These local alternative links traverse Class B scenery characterized by bajadas and foothills of the Rincon and Empire Mountain Ranges and are associated with high sensitivity. Impacts to scenery are anticipated to be low where the Project would parallel existing transmission lines. Other recreation areas within the southern trail study area near these local alternative links include Colossal Cave, Rincon Mountain Wilderness, and Cienega Creek Natural Preserve. At the crossing of the ANST, the Project would parallel two 345 kV transmission lines that are approximately 0.25-mile wide. Impacts to recreation viewers at the trail crossing are anticipated to be moderate because the existing transmission lines would have similar form, line, and scale as the Project and would reduce visual contrast. At the Gabe Zimmerman Davidson Canyon Trailhead, impacts are anticipated to be moderate where the Project would be viewed within 1 mile while crossing rolling terrain. In addition to paralleling the existing transmission lines, the Project would be backdropped by adjacent terrain that would also reduce contrast. Selective mitigation measures 5 and 7 (reclamation plan and modified tower design) would also reduce contrast in this area. Other recreation values include travel routes that may provide user access to trailhead locations. These local alternative links do not cross these travel routes, although the Project may be visible from these locations. Impacts to viewers along Pistol Hill Road and the Old Spanish Trail would be low, because the Project would be viewed through the existing transmission line corridor and visual contrast would thus be reduced. The Project would be visible to viewers along Pantano Road, which occurs within 0.25 mile of the road, and would be viewed in context with the existing transmission lines that are located on the north side of the Project. Impacts are anticipated to be low-moderate, although an isolated portion of Link F40b crossing steep terrain would result in moderate-high impacts.

Historic and Cultural Resources

There are no known historic or cultural resources associated with the ANST, because the trail was constructed to avoid these sensitive resources; therefore, impacts are not anticipated. Because cultural resources have not been fully inventoried within the trail corridor, resources near the trail could be affected by the Project; however, none are currently known.

Biological, Natural, and Other Resources

Cienega Creek is a perennial water source and identified Pima County Biological Core Area that is crossed by Link F51. Although the Project would span this area, thereby reducing disturbance within this resource value, impacts are anticipated (see Section 4.6 – Biological Resources) because of the special status species that are supported by this resource, as well as the presence of riparian vegetation. Existing disturbance may be associated with other transmission lines crossing Cienega Creek.

Route Group 4 Summary

The BLM preferred alternative for Route Group 4 would result in low-moderate to high impacts to inventoried resources, qualities, values, and associated settings of the scenic trail. The BLM preferred alternative would result in high impacts where the scenic trail would be crossed by the Project in a setting with few cultural modifications. Overall, based on the results of the impact assessment, Subroute 4C2c would affect the intended experience of the ANST, and without mitigation would result in high impacts to its resources, qualities, values, and associated settings; thus the nature and purpose would be substantially compromised for this section of the trail for the following reasons:

- The primary purpose of the ANST is to: “provide a primitive, long distance trail that highlights the State’s topographic, biologic, historic, and cultural diversity.” The trail study area north of Oracle is reflective of a primitive, long distance hiking experience with few cultural modifications where the Project would be visible from the trail. The introduction of the BLM preferred alternative in this area would alter the existing primitive landscape setting (including scenic quality) and would result in high impacts to recreation viewers. Therefore, the BLM preferred alternative could result in substantial interference with the stated nature and purpose of the trail as defined by the ANST Trail Administrator. It is important to note however, that strongest effects to the trail’s resources, qualities, values, and associated setting would be limited to a roughly 6-mile-wide corridor where the Project would cross the trail, which is approximately 0.7 percent of the total trails total length. The implementation of selective mitigation measures 6 and 10 (limit access and maximize span at crossing) would limit impacts to viewers although high impacts would remain in close proximity of the Project.
- Off-site mitigation measures would be required to address substantial interference with the nature and purposes of the trail and the identified high impacts to viewers and the setting. Off-site mitigation measures sufficient to compensate for the loss of scenic and recreation values could involve ANST corridor protection measures, such as securing a wider corridor in the Project area through the acquisition of land or easements. Specifics

for off-site mitigation would be negotiated with the applicant, lead agency, and trail administrator during the development of the final Plan of Development for the Project.

- Project related access roads should not cross the trail and disturbance of the trail tread should be avoided. The ANST is intended to be in a non-motorized setting and mitigation would include measures to prevent motor vehicles of any kind from accessing the ANST during or after construction. Use of selective mitigation measure 2 (no new access roads) would reduce the chances of Project roads being used by the public for motorized access.

1.7.3.3 Trails Recommended as Suitable for National Trail Designation

Butterfield Overland Mail and Stage Route (Historic)

Subroute 4C2c – BLM Preferred Alternative

Scenic and Recreation Resources

The majority of the Butterfield Trail study area traverses developed land associated with agriculture. A small portion of the BLM preferred alternative crosses Class C scenery and low sensitivity undeveloped land near the Picacho Reservoir. Impacts are anticipated to be low due to existing cultural modifications and the presence of similar utility infrastructure.

Historic and Cultural Resources

No segments of the Butterfield Trail have been identified for Route Group 4.

Biological, Natural, and Other Resources

Impacts to biological or natural resources associated with the trail are anticipated to be low for the BLM preferred alternative, because there are no identified biological, geological, and scientific resources for the trail study area.

Subroute 4A – North of Mt. Graham

For the Butterfield Trail study area near Pinal Substation, Subroute 4A would have similar impacts to resources, values, and settings as described for the BLM preferred alternative.

Subroute 4B – Sulphur Springs Valley

For the Butterfield Trail study area near Pinal Substation, Subroute 4B would have similar impacts to resources, values, and settings as described for the BLM preferred alternative.

Subroute 4C1 – East of San Pedro River

For the Butterfield Trail study area near Pinal Substation, Subroute 4C1 would have similar impacts to resources, values, and settings as described for the BLM preferred alternative.

Subroute 4C2 – West of San Pedro River

For the Butterfield Trail study area near Pinal Substation, Subroute 4C2 would have similar impacts to resources, values, and settings as described for the BLM preferred alternative.

Subroute 4C3 – Tucson

Scenic and Recreation Resources

Subroute 4C3 traverses Class B scenery characterized by bajadas and foothills of the Rincon and Empire Mountain Ranges that are associated with high sensitivity lands. Impacts to scenery are anticipated to be moderate-high to high where the Project would require new access (Link C600) while crossing rolling to steep terrain. The Project's visual features, mostly strong vertical and angular lines, would contrast with the landscape setting, thereby resulting in higher impacts. Contrast would be reduced when parallel to existing transmission lines because the Project would be congruent with this landscape and the existing conditions, thus resulting in moderate to low-moderate impacts to these scenic resources.

For the Butterfield Trail study area, the landscape setting has been heavily modified by development associated with the Tucson metropolitan area (links F111, F112, and F510). This subroute parallels existing transmission lines, travel routes, railroad corridors, and pipeline routes within the developed area. The level of visual contrast introduced by the Project would be negligible in these highly developed areas. Santa Cruz River Parkway is a developed recreational trail along the Santa Cruz River that is associated with the Anza Trail. Although the Butterfield Trail is under study, the common corridor for these two trails along the Santa Cruz River may be an interpretive opportunity or resource for the trail. This river corridor is highly channelized through the Tucson metropolitan area and has incorporated paved trails for recreation. Existing transmission line facilities have been located within this corridor and the Project would parallel these utilities with similar form, line, color, and texture, thereby reducing visual contrast. Overall, impacts to recreation viewers along this recreational trail would be low to low-moderate, due to the existing modifications that dominate the setting.

Historic and Cultural Resources

No segments of the Butterfield Trail have been identified for Route Group 4.

Biological, Natural, and Other Resources

Biological, natural, and other resources associated with the trail are minimal in the developed metropolitan area of Tucson; thus, impacts are not anticipated. Cienega Creek is a perennial water source and identified Pima County Biological Core Area that is crossed by Link F600. Although the Project would span this canyon, thereby reducing disturbance within this resource value, impacts are anticipated to be high for an isolated portion of Subroute 4C3 (see Section 4.6 – Biological Resources) because of the special status species that are supported by this resource, as well as the presence of riparian vegetation.

Local Alternative Links F40a, F40b, F51, F60a, F60b, F81a, and F81b

Scenic and Recreation Resources

These local alternative links traverse Class B scenery characterized by bajadas and foothills of the Rincon and Empire Mountain Ranges, and associated with high sensitivity along the Arizona Trail. Impacts to scenery are anticipated to be low where the Project would parallel existing transmission lines. Links F40a, 40b, F51, F60a, and F60b would result in low-moderate impacts to these scenic resources, because the Project would parallel existing utilities with similar form, line, and scale. At the crossing of the Butterfield Trail, the Project would parallel two 345 kV transmission lines that are approximately 0.25 mile wide. Links F81a and F81b are associated with the developed area of Tucson. Since there are no developed recreation facilities associated with the Butterfield Trail, impacts are not anticipated.

Historic and Cultural Resources

No segments of the Butterfield Trail have been identified for Route Group 4.

Biological, Natural, and Other Resources

Cienega Creek is a perennial water source and identified Pima County Biological Core Area that would be crossed by Link F51. Although the Project would span this canyon, thereby reducing disturbance within this resource value, impacts are anticipated to be high (see Section 4.6 – Biological Resources) because of the special status species that are supported by this resource, as well as the presence of riparian vegetation. Existing disturbance may be associated with other transmission lines crossing Cienega Creek.

Route Group 4 Summary

The BLM preferred alternative for Route Group 4 would result in low impacts to inventoried resources, values, and settings of the Butterfield Overland Mail and Stage Route. The majority of the trail study area is associated with agricultural land developed near the Pinal Central Substation, and the Project would parallel or be viewed in context with several existing transmission lines. Overall, based on the results of the impact assessment, the BLM preferred alternative 4C2c is not anticipated to adversely impact the historic trail.

1.7.4 Cumulative Effects

In addition to direct and indirect effects, this section addresses the cumulative effects of the proposed action that would result from the construction and operation of the Project, combined with other reasonably foreseeable future actions. For detailed process and methods for analysis, scoping and Project issues, parameters, identification of past, present, future, and reasonably foreseeable future actions, land uses, and projects, including energy development forecast analysis, see Chapter 4.17 of the Final EIS.

Cumulative effects to National Scenic and Historic Trails were evaluated in the context of a trail's resources, qualities, values, associated settings, and primary use or uses in a manner

similar to the Environmental Consequences Section of this Appendix. However, for the cumulative effects assessment and discussion, it is assumed that the resources, qualities, values, and associated settings are similar to portions of the trails that were inventoried and assessed in this appendix. Cumulative effects are interdisciplinary, multijurisdictional, and usually do not conform to political boundaries. The geographical extent for the National Scenic and Historic Trails cumulative effects analysis for SunZia, for NST, was generally associated with the entire length of the continuous trail within the field offices traversed by the Project. For NHT, the area of analysis was limited to the high potential route segments, high potential historic sites, and auto tour routes identified in the areas traversed by the Project, in consideration of other reasonably foreseeable projects along the National Trail. Past, present, and reasonably foreseeable future actions that were considered for this analysis are described in Table 4-30 of the Cumulative Effects Section of the Final EIS (Section 4.17). The following is a summary of cumulative effects on National Scenic and Historic Trails for the Project and Energy Development Scenarios during construction and operation.

1.7.4.1 Scenic and Recreation Resources

Cumulative effects to scenic and recreation resources relate to the modification of landscape scenery and the viewsheds associated with public viewing areas. Cumulative effects to scenic resources could result from: (1) the incremental modification of landscape character (i.e., settings) in natural areas, and (2) altering the viewsheds associated with trail-related public viewing locations based on the construction and operation of the Project in context with past, present, and reasonably foreseeable future actions. Cumulative impacts to recreation resources may occur as a result of the construction and operation of the Project, as well as from reasonably foreseeable future projects that could include the development of new and temporary access roads and staging yards, as well as the operation of industrial-scale renewable projects, both wind and solar, as described in the cumulative effects (Section 4.17) of the Final EIS. These cumulative effects to recreation resources, values, and qualities can be both experiential (i.e., primitive nature of trail is altered by the indirect introduction of OHV use) and physical (i.e., the actual right-of-way of a trail [or associated linkages] is modified in a manner that the intended land use is changed). Cumulative effects for scenic and recreation resources in context with National Trails would occur over the life of the Project.

Cumulative Effects Analysis for SunZia

Generally, construction activities associated with the Project would include: upgrading or construction of access roads, clearing and grading activities for the right-of-way, excavating and installation of foundations, assembling structures with temporary and permanent pad sites, stringing conductors and shield wires, and clean-up and reclamation of affected areas. Some activities associated with construction, such as access roads, pad sites, and staging areas (as identified in the POD) would be temporary. Areas disturbed by temporary construction activities (i.e., access roads, staging areas, temporary pad, or pulling and tensioning sites) would not be required for routine maintenance activities during operation. These temporary areas will be identified in the POD and restored at the end of construction. Project-related access identified for closure near National Trails would be restored at the end of construction. Temporary construction activities would result in cumulative effects that would contribute incrementally

from the reasonably foreseeable actions. Operation activities associated with the Project would be ongoing and long-term, and would occur along the right-of-way for the life of the Project. The proposed transmission line structures, substations, and associated long-term access would be permanent and require routine maintenance, including vegetation maintenance in areas where forests occur. Operation of the reasonably foreseeable actions would permanently alter the scenic resources and change the viewsheds associated with recreation resources for the life of the Project.

Reasonably foreseeable actions that would likely have direct cumulative effects to visual resources during construction of the proposed Project include residential development, agricultural development, airport and military infrastructure development, and transportation corridor development. Construction would require grading and/or removal of vegetation, which would introduce landscape contrast into the study area. These developments, when added to direct effects of the proposed Project, would incrementally convert the natural landscape into a developed or urban landscape that would adversely affect the scenery over time. Specific projects that would alter landscape scenery for the National Trails include Willow Springs Ranches Residential Subdivision (Camino Real NHT) and Willow Springs Residential Subdivision (Arizona NST). Other types of reasonably foreseeable actions within the study corridor that are more industrial include mining and mineral development, utility development such as HVTLS, power generation stations, and substations. These developments, when added to direct effects of the proposed Project, would incrementally convert natural landscapes into industrial landscapes, which over time would adversely affect scenic resources associated with National Trails. In the context of the proposed Project, cumulative effects to scenic resources would occur based on the industrialization of natural appearing landscapes and the modification of views from sensitive recreation resources. Areas associated with high-quality recreation opportunities that are relatively free from visual intrusions would be adversely affected (ANST, CDNST). In addition, conservation, protection, and restoration of National Trail resources would be incrementally affected by reasonably foreseeable actions within the study area. The primary use or uses of NSTs could be adversely affected by unauthorized OHV if selective mitigation measures were not successful. The primary use or uses of NHTs along auto tour routes could be adversely affected by reasonably foreseeable actions if the route designation was changed in the CMP.

Specific projects that would have the greatest effect on scenic resources include the Southline Transmission Line Project (CDNST, ANST, Anza Trail, and Butterfield Trail) and the Pinal Central 500kV Transmission Line Project (Anza NHT, Arizona NST, and Butterfield Historic Trail). These projects would potentially be constructed in the same corridor as the proposed Project, and therefore would contribute to the modification of scenic resources associated with the study area. Although construction of these projects would not occur at the same time as the proposed SunZia Project, the introduction of these reasonably foreseeable actions (linear projects) would increase dominance along the Project corridor and would affect scenic resources and recreation viewers. If these projects are consolidated, then construction disturbance would be focused within a specific area rather than multiple projects occurring at intermittent locations. Cumulative effects would be greater where they are not consolidated because more trail-related resources, qualities, values, and associated settings may be affected by these actions. Where these projects may be consolidated, cumulative effects during construction could be further

reduced if structure spans were matched (where feasible), potential right-of-way distance minimized, and restoration of temporary construction areas (i.e., access roads) occurred.

The existing and proposed Macho Springs Wind Project (Camino Real NHT, Butterfield Trail), Saguaro Solar Power Plant/Solargenix (Anza Trail, ANST, Butterfield Trail), SOLON Solar Project (ANST, Anza Trail, Butterfield Trail), and Bowie Power Station Project (Butterfield Trail) would all contribute to the modification of scenic resources in context with the proposed Project. Reasonably foreseeable actions within the SunZia study area that could contribute to cumulative effects include the Avra Valley Solar Project (Anza Trail, ANST, Butterfield Trail), UA Tech Park Thermal Storage Demonstration Project (ANST, Butterfield Trail), and Fotowatio Solar Project (Anza Trail, ANST, Butterfield Trail). These projects would result in construction modifications that would adversely affect scenic resources associated with the trail, by introducing numerous vertical and geometric structures within a largely flat and horizontal landscape. In addition to effects on scenery, the introduction of the proposed Project in context with these other projects would have a cumulative effect on recreation viewers using the National Trail, including but not limited to the developed recreational trail, local travel routes, and recreation resources associated with the trail. The intensity of cumulative effects would vary based on distance from the trail viewers to the facility, presence of man-made features in the landscape, and Project visibility.

Other past, present, and reasonably foreseeable projects such as mines, transportation corridors, fiber optic lines, rail, and other land disturbing projects would result in adverse cumulative effects to both scenic and recreation resources. Cumulative effects could possibly be reduced by consolidating, to the extent practicable, like facilities and sharing access whenever possible.

Cumulative Effects Analysis, Including Energy Development Scenarios

Cumulative effects to scenic and recreation resources also considered the potential for renewable energy development in the vicinity of the proposed Project. Although the visual influence of the proposed Project would not necessarily encompass the entirety of the renewable energy development areas (i.e., direct effects), the typical scale of renewable energy projects requires a large area of effect, as compared to transmission line projects. Therefore, it is reasonable to assess the potential renewable energy development zones in context with the Project from a cumulative effects aspect. Following are cumulative effects for construction and operation based on potential wind and solar energy development.

Potential wind and solar development could occur in both New Mexico and Arizona in the vicinity of the proposed Project (although the majority of potential wind development would occur in eastern New Mexico). These types of development typically require surface disturbance that result in strong visual contrast. Based on current solar technology, vegetation would be removed within the footprint of potential solar facilities, which adversely affects landscape scenery. Over time, each additional solar facility (and associated transmission line) would incrementally convert the character of affected landscapes from natural to industrial. In addition, cumulative effects to recreation viewers within the vicinity of the solar development areas would occur based on what type of solar technology would be implemented. Photovoltaic technology has a relatively low profile, such that viewer impacts are reduced. Concentrating Solar Trough, or “Power Tower,” technologies have components that are typically high profile and increase

potential impacts to viewers. Other anticipated cumulative effects resulting from potential solar facilities, per the Draft Solar PEIS (BLM and DOE 2010), include: effects to night skies associated with illumination requirements for maintenance and nighttime operation; effects to sensitive viewsheds, based on the introduction of glint and glare, depending on the type of solar technology developed; and effects to landscape setting, based on the formal geometric shapes associated with industrial-scale facilities. Although the identified reasonably foreseeable actions are unlikely to physically impact the trail (i.e., resulting in the need to relocate the trail due to the project footprint), experiential impacts to recreation viewers would occur for large wind farms or solar facilities within proximity of the trail. Similar to reasonably foreseeable actions that are linear (i.e., transmission, pipeline), the resources, qualities, values, and associated settings would have cumulative effects throughout the area of analysis. Where feasible, consolidation of associated transmission lines for these actions would be recommended as a mitigation measure to reduce cumulative effects. Mitigation may also include trail education kiosks or, as identified by the Trail Administrator, off-site mitigation could be specified on a case-by-case basis. Mitigation measures for future actions that may physically impact the trail could include visual buffers along the trail so that these actions would be located farther from the trail to physically preserve trail-related resources, although experiential impacts would still occur for recreation viewers.

1.7.4.2 Historic and Cultural Resources

Incremental impacts to cultural resources result from past, present, and reasonably foreseeable future projects. Ground disturbance associated with linear facilities, such as transportation corridors (i.e., I-10, I-25, I-19, US Route 191, UPRR, and Atchison, Topeka, and Santa Fe Railroad) has had major incremental cumulative effects because many transportation corridors follow older trails or corridors that were used historically. For example, portions of El Camino Real NHT that parallels I-25 and the historic alignment of the Butterfield Trail that parallels a portion of I-10 may have been partially or wholly destroyed because of the development of transportation corridors. The proposed alternative routes would extend across segments of several historic trails of various levels of significance. Although the proposed transmission line would not physically impact the existing trails, a potential remains for visual impacts. While the Project would have a small incremental effect on historic trails as a whole, the cumulative effect of linear projects either crossing or paralleling historic trails would result in incremental degradation to the historic feeling and setting of these trails.

1.7.4.3 Natural Resources

Construction of the proposed Project would have several types of effects to natural resources in common with other current and future developments in the region. Cumulative effects to natural resources relates to ground disturbance and the resulting loss of biological, geological, and scientific resources. Cumulative effects for scenic natural resources related to the trail would occur over the life of the Project.

Cumulative Effects Analysis for SunZia

Ground disturbance and the resulting loss of biological, geological, and scientific resources is an effect common to all new development, and in most cases, results in additive cumulative effects

to these resources. Related direct effects restricted to the vicinity of construction areas include associated noise and disturbance of local wildlife. The proposed Project would contribute to ongoing loss of natural habitat in the cumulative effects analysis area where ground disturbance is required, although this is mitigated where possible by siting the proposed Project near existing areas of disturbance. Any future development may contribute to habitat loss, although most reasonably foreseeable actions within the analysis area are likely to be near previously disturbed areas. In general, most types of development avoid high-sensitivity habitats of high quality. Some indirect effects of construction can result in off-site effects that are greater than the additive effects of habitat loss within a construction area. Initially, invasion of noxious weeds and other non-native plants tend to concentrate around areas of recently disturbed ground, expanding outward into undisturbed habitat under favorable conditions. Each additional ground disturbing activity provides a new potential foothold for invasive plants, and could allow effects to extend rapidly beyond the initial area of disturbance. Erosion, particularly where construction occurs in steep terrain or near surface water, may result in silt being carried downstream, potentially altering stream substrate and aquatic habitat. Although these effects may occur with current and future development in the cumulative effects analysis area for National Trails, standard and selective mitigation measures for the proposed Project would minimize any contribution to these cumulative effects to the extent feasible.

Effects of operation of the proposed Project include those related to the presence of access roads and associated maintenance activities, and the presence of transmission structures and lines in the environment. In general, locating multiple linear utilities in the same area minimizes cumulative effects on biological resources. Total ground disturbance is reduced because access roads may serve multiple projects, and other effects to biological resources such as maintenance activities, recreational or other use of access roads, and risk of invasive plant spread would affect a smaller portion of the landscape than if utilities were widely separated. However, utility corridors may create edge effects or act as dispersal barriers, and so co-locating utilities is not universally beneficial to all types of biological resources (i.e., vegetation, wildlife, etc.). However, the benefits of reducing total ground disturbance when multiple linear utilities are co-located may outweigh the negative effects of increased local intensity of disturbance in many cases (see Section 4.17.4.6 for detailed cumulative effects to Biological Resources).

Cumulative Effects Analysis, Including Energy Development Scenarios

Development and operation of wind energy facilities have several types of impacts in common with construction and operation of the proposed Project. Ground disturbance, maintenance activities, gen-tie transmission lines, the risk of invasive plant colonization, and construction activities are impacts associated with wind energy that are similar to the development of major transmission lines (BLM 2005). Wind turbines and major transmission lines create collision hazards for birds. However, the risk posed by transmission lines is relatively dispersed, except where a line would cross major migration corridors. Siting wind energy facilities away from major migration corridors reduces the collision risk to migratory birds, but may still affect resident birds. Impacts associated with solar development are much more intensive than those associated with wind energy or transmission lines. Solar fields are generally large and contiguous, from tens to hundreds of acres, and often require complete vegetation removal and elimination of all wildlife habitats within the project footprint (BLM and DOE 2010).

Engineering constraints require placement of solar fields in large, level areas. Although sensitive montane and riparian habitats are not generally impacted by solar development, a number of species associated with level valley bottoms in the Sonoran Desert are threatened by ongoing urban and agricultural development of those areas. Solar energy development, when not located on previously disturbed land, contributes to the decline of these biological resources.

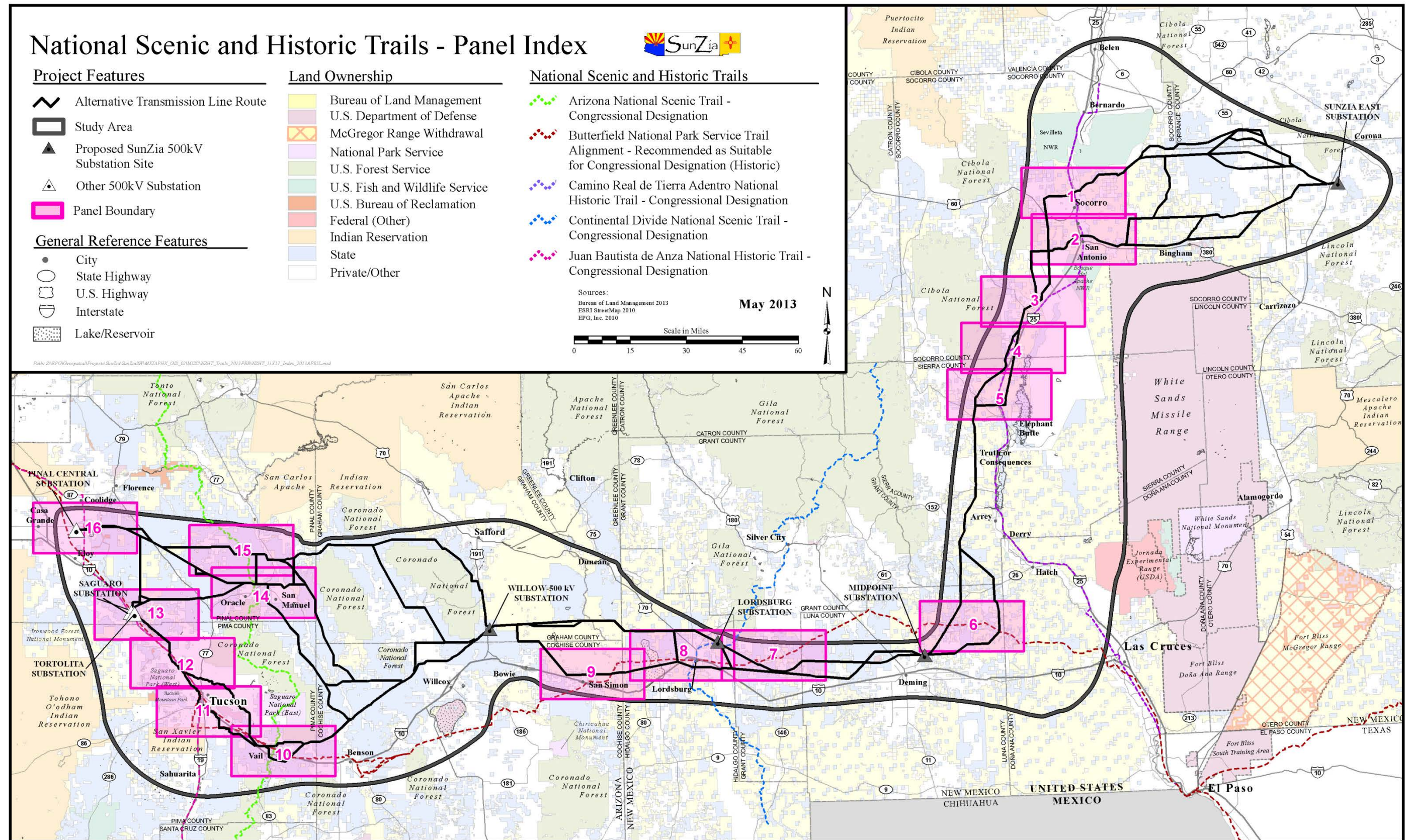


Figure L-1. Panel index map illustrating the locations for the Project-level NTS assessment.

This page intentionally left blank.

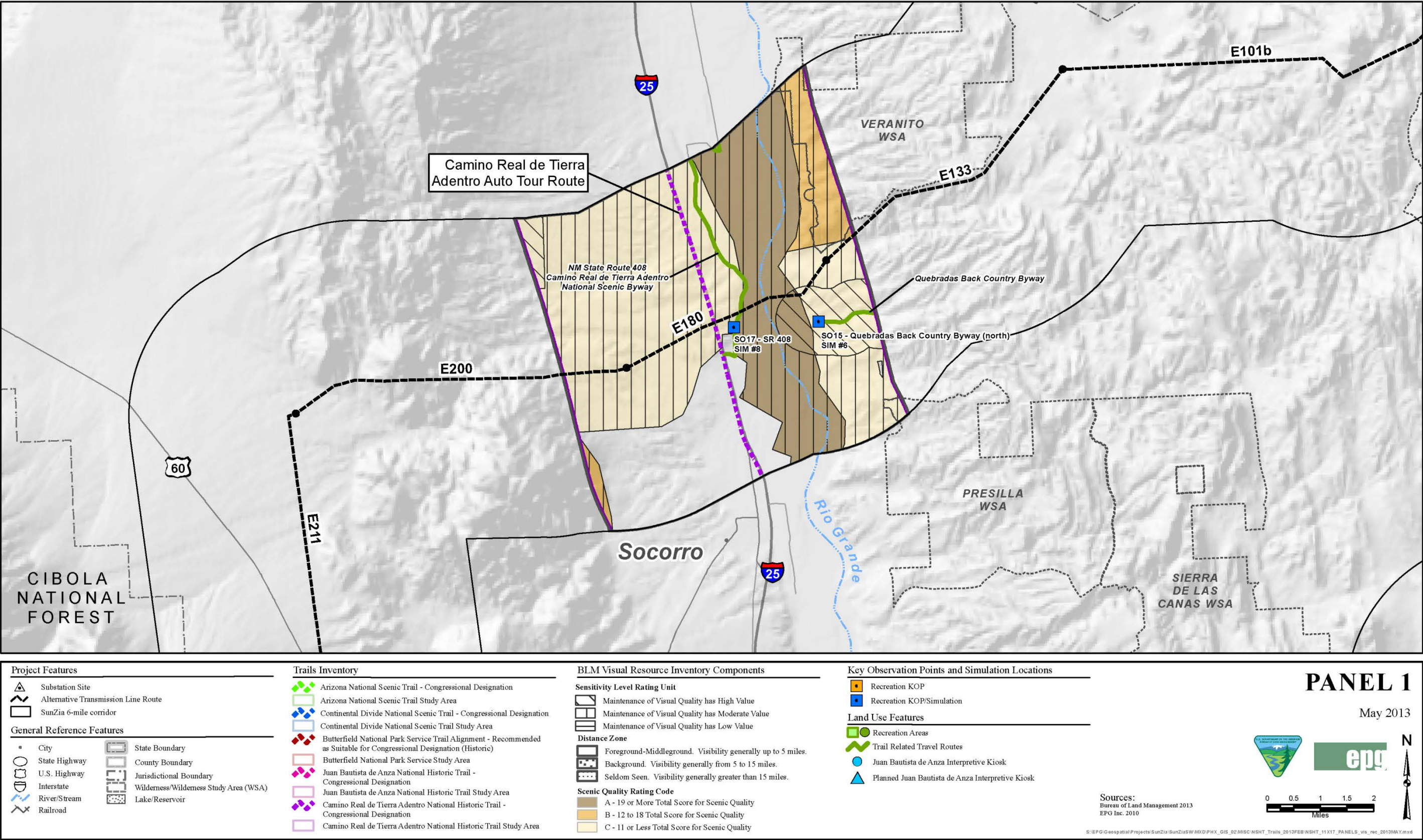


Figure L-2. Detailed trail inventory for visual and recreation resources (Panel 1)

This page intentionally left blank.

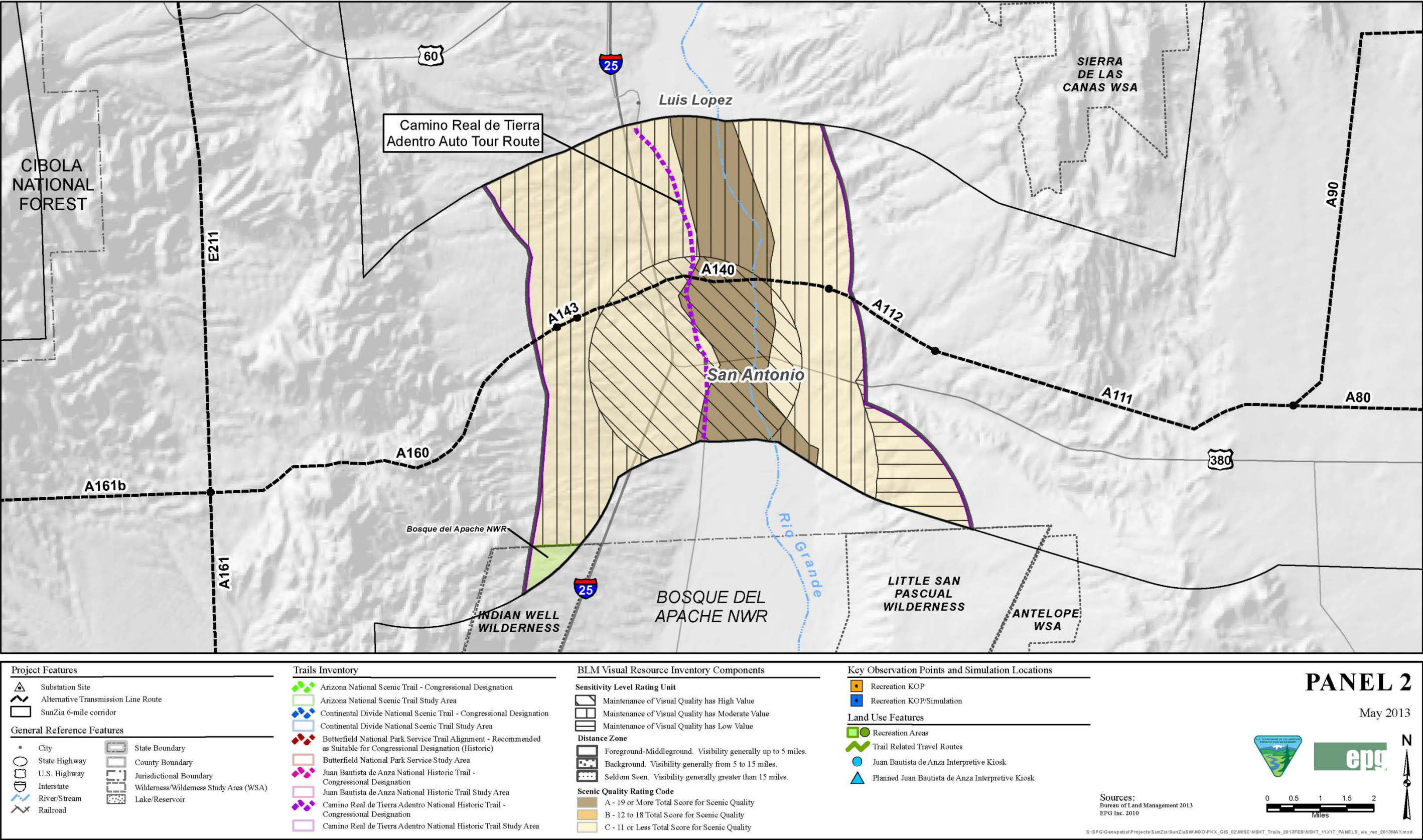


Figure L-3. Detailed trail inventory for visual and recreation resources (Panel 2)

This page intentionally left blank.

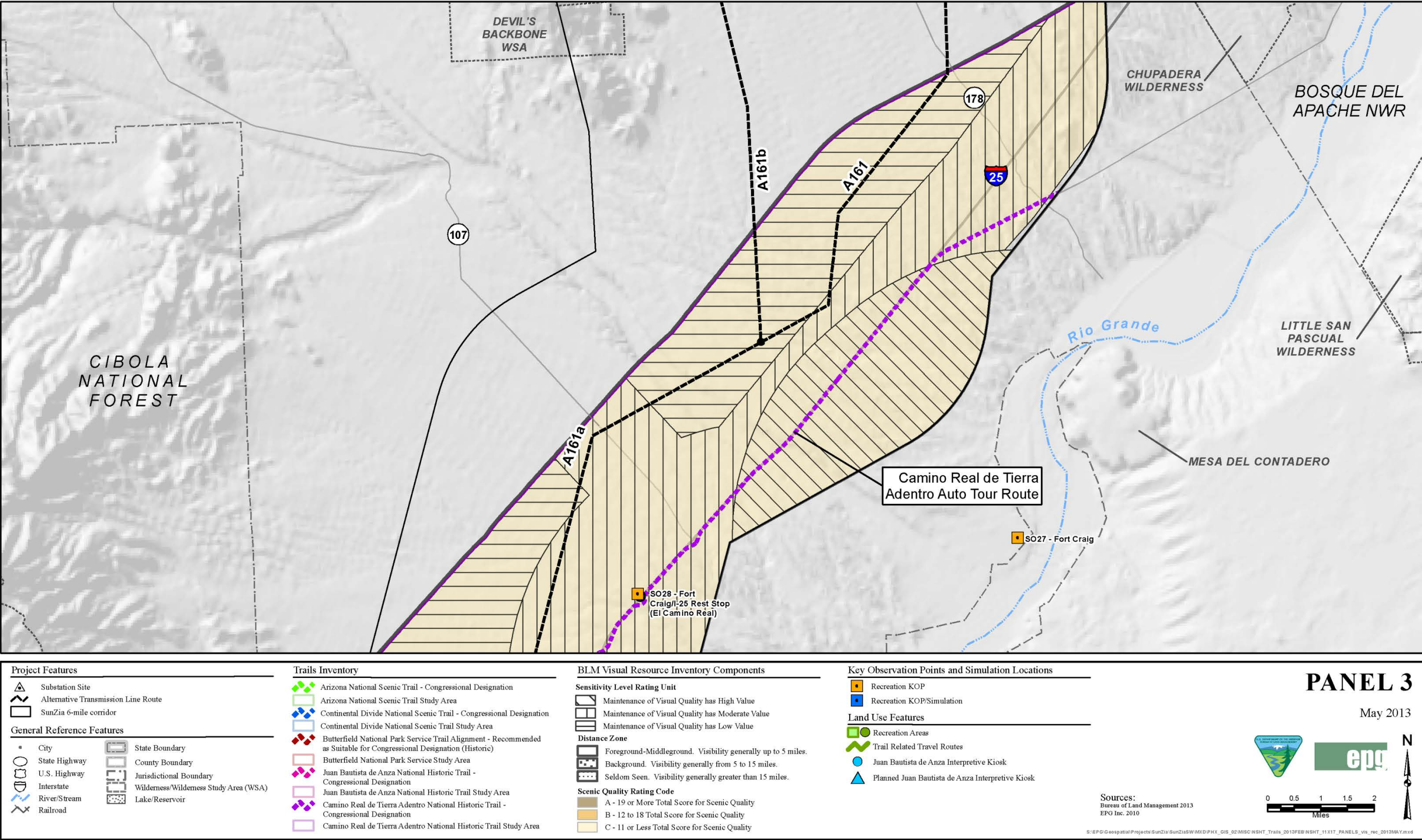


Figure L-4. Detailed trail inventory for visual and recreation resources (Panel 3)

This page intentionally left blank.

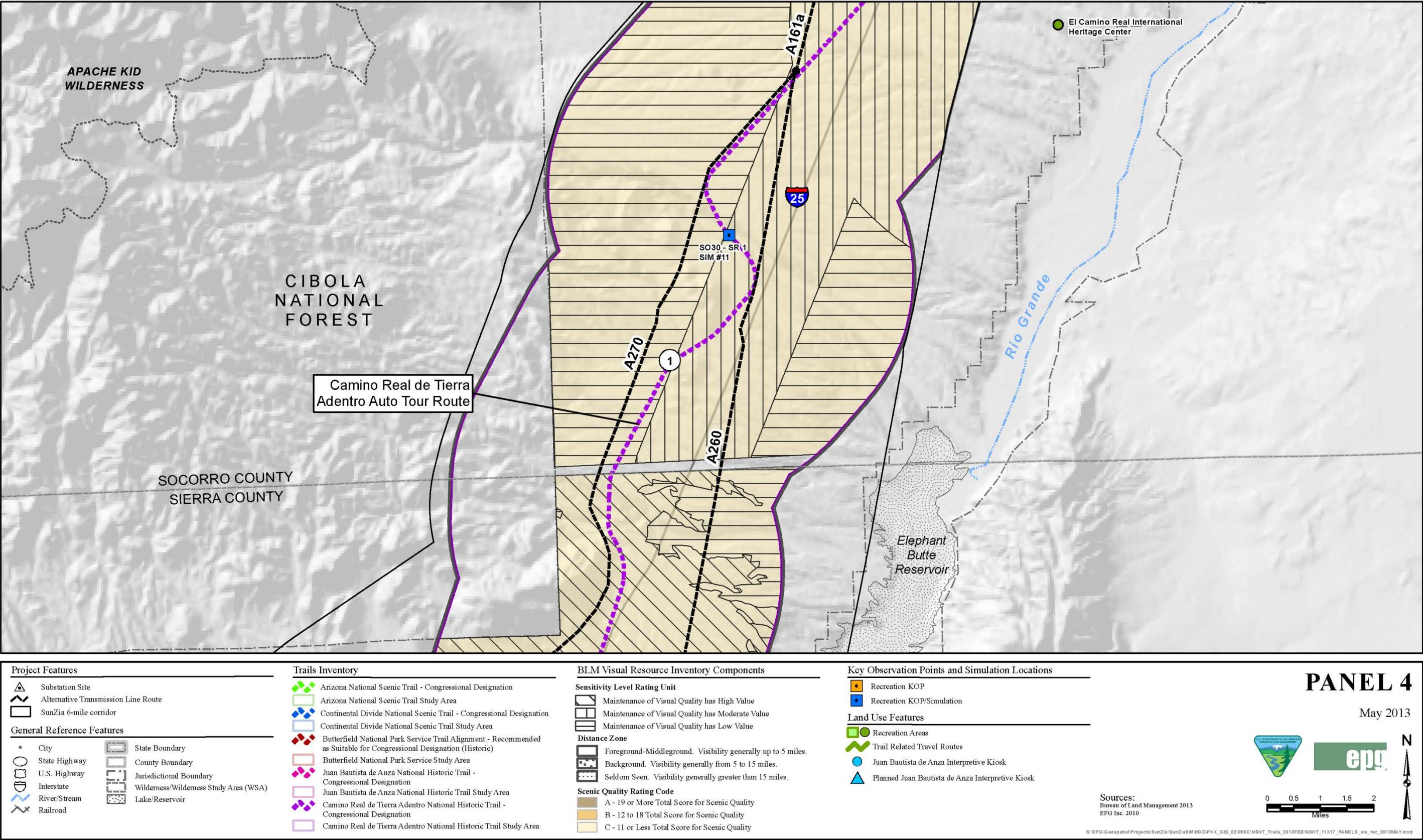


Figure L-5. Detailed trail inventory for visual and recreation resources (Panel 4)

This page intentionally left blank.

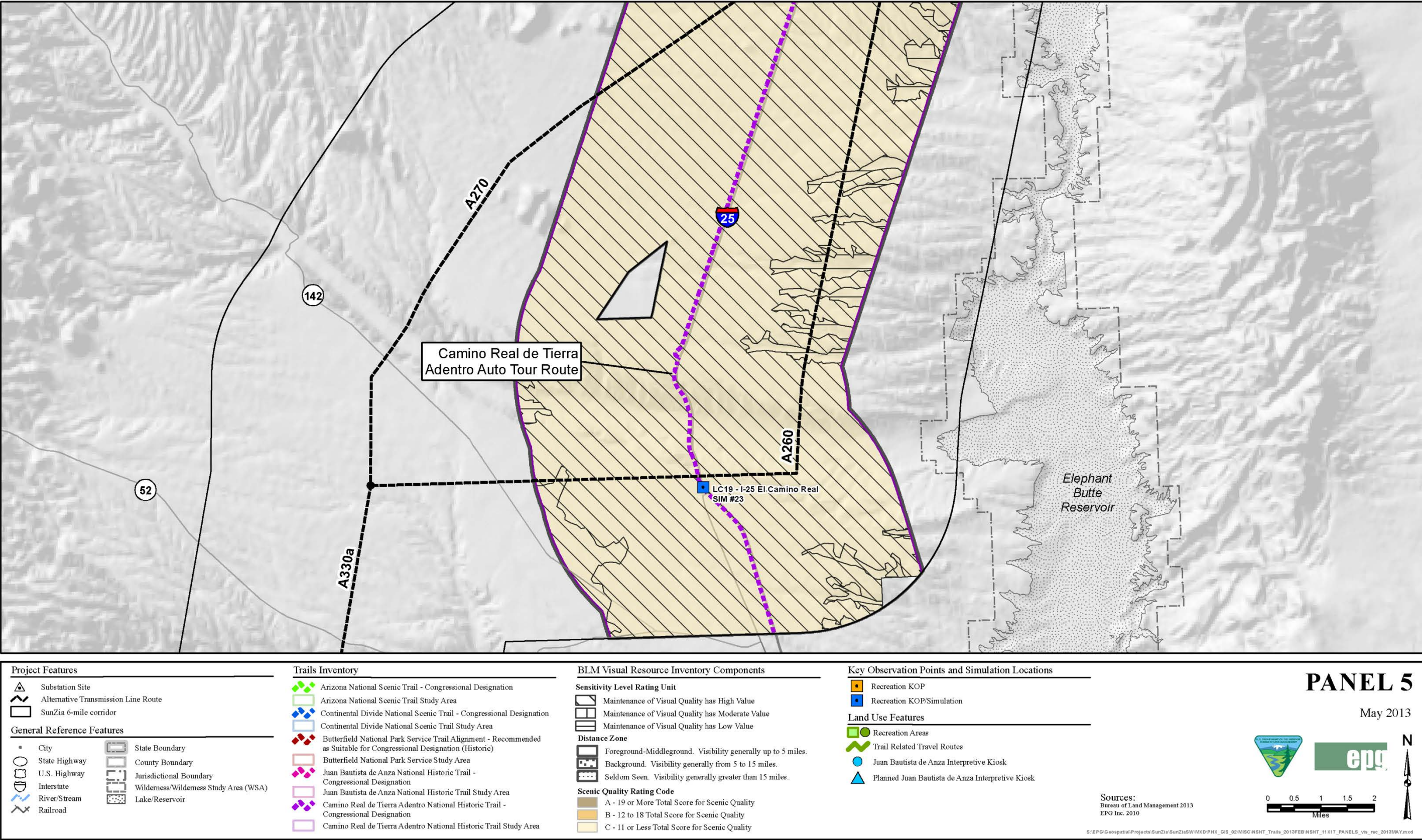


Figure L-6. Detailed trail inventory for visual and recreation resources (Panel 5)

This page intentionally left blank.

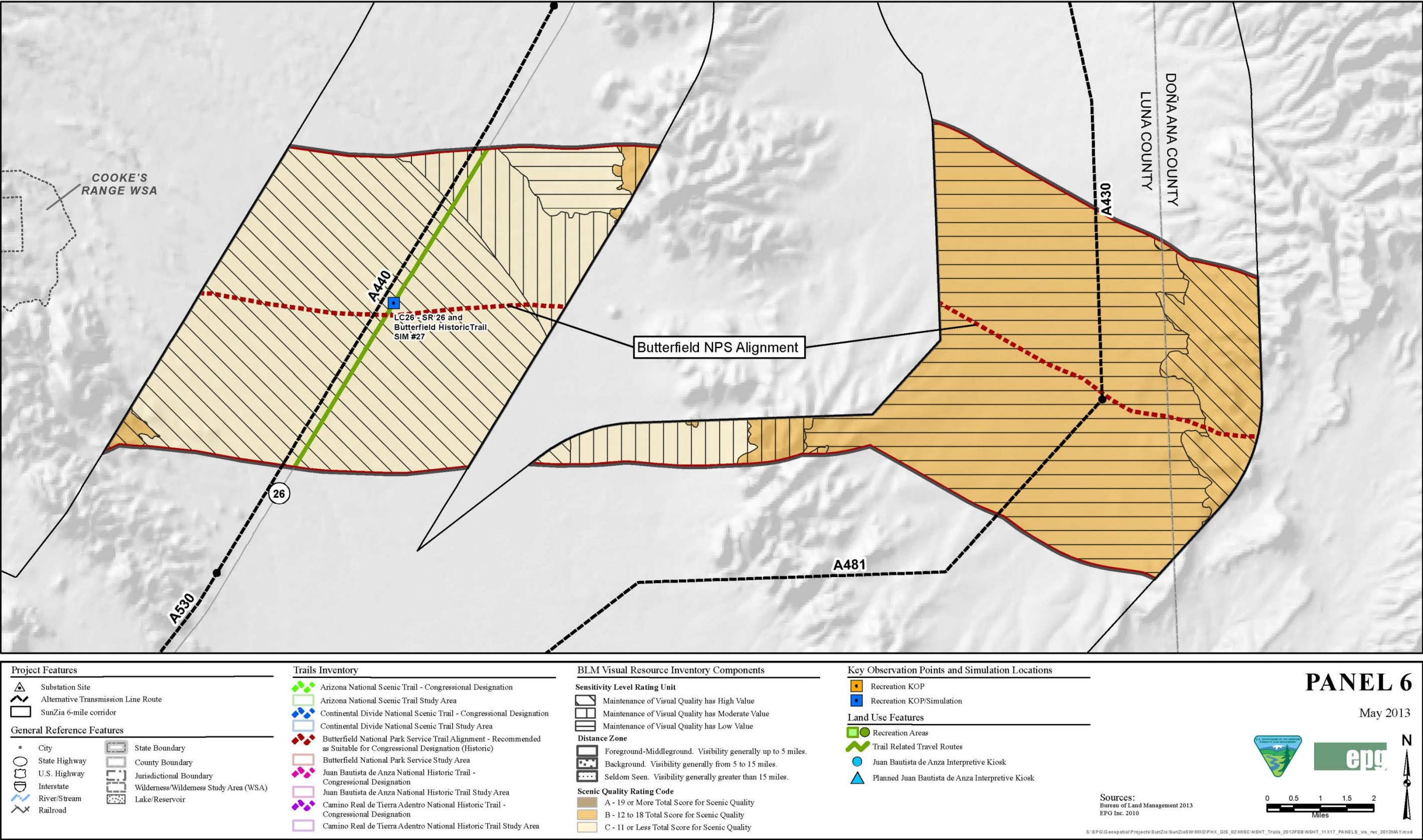


Figure L-7. Detailed trail inventory for visual and recreation resources (Panel 6)

This page intentionally left blank.

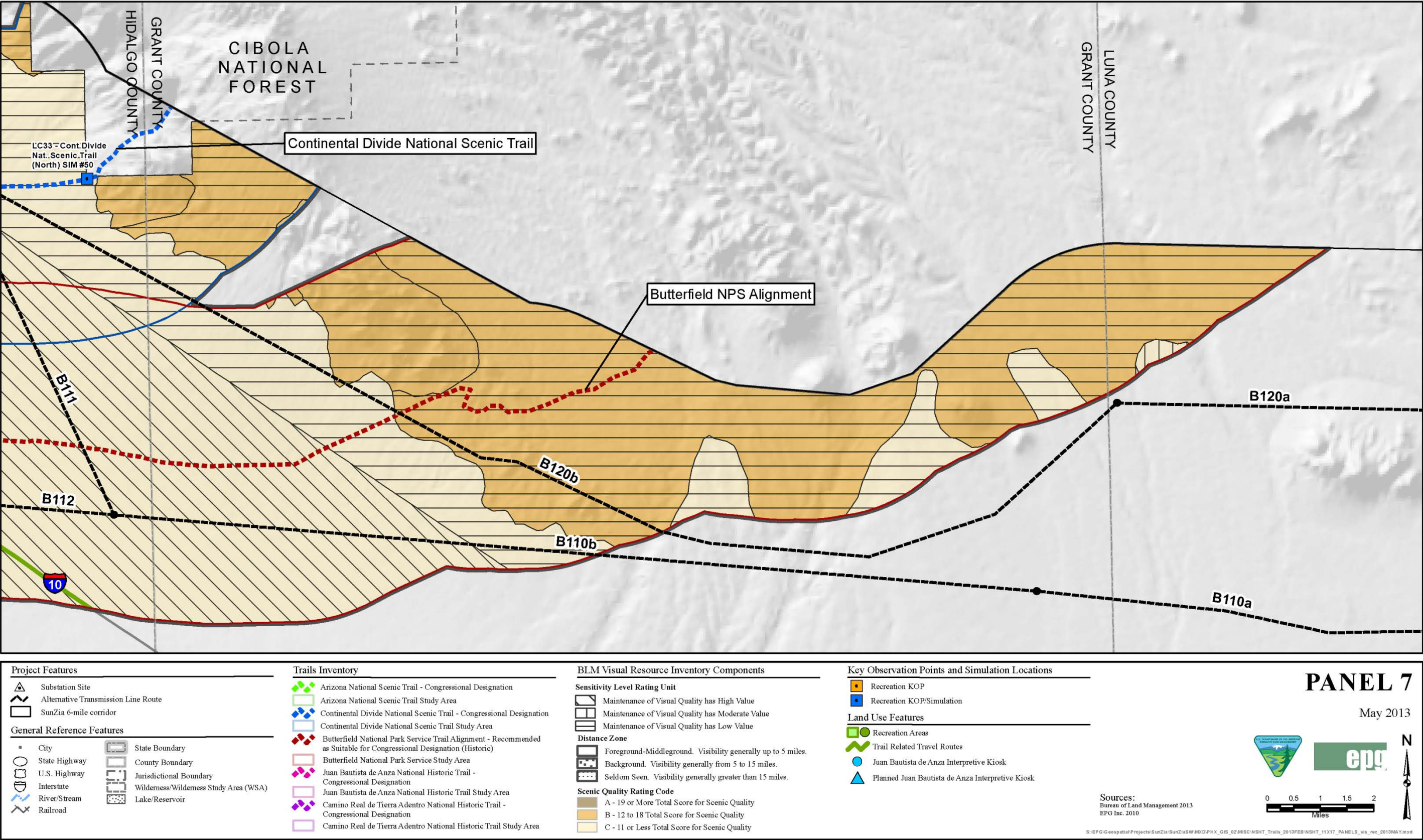


Figure L-8. Detailed trail inventory for visual and recreation resources (Panel 7)

This page intentionally left blank.

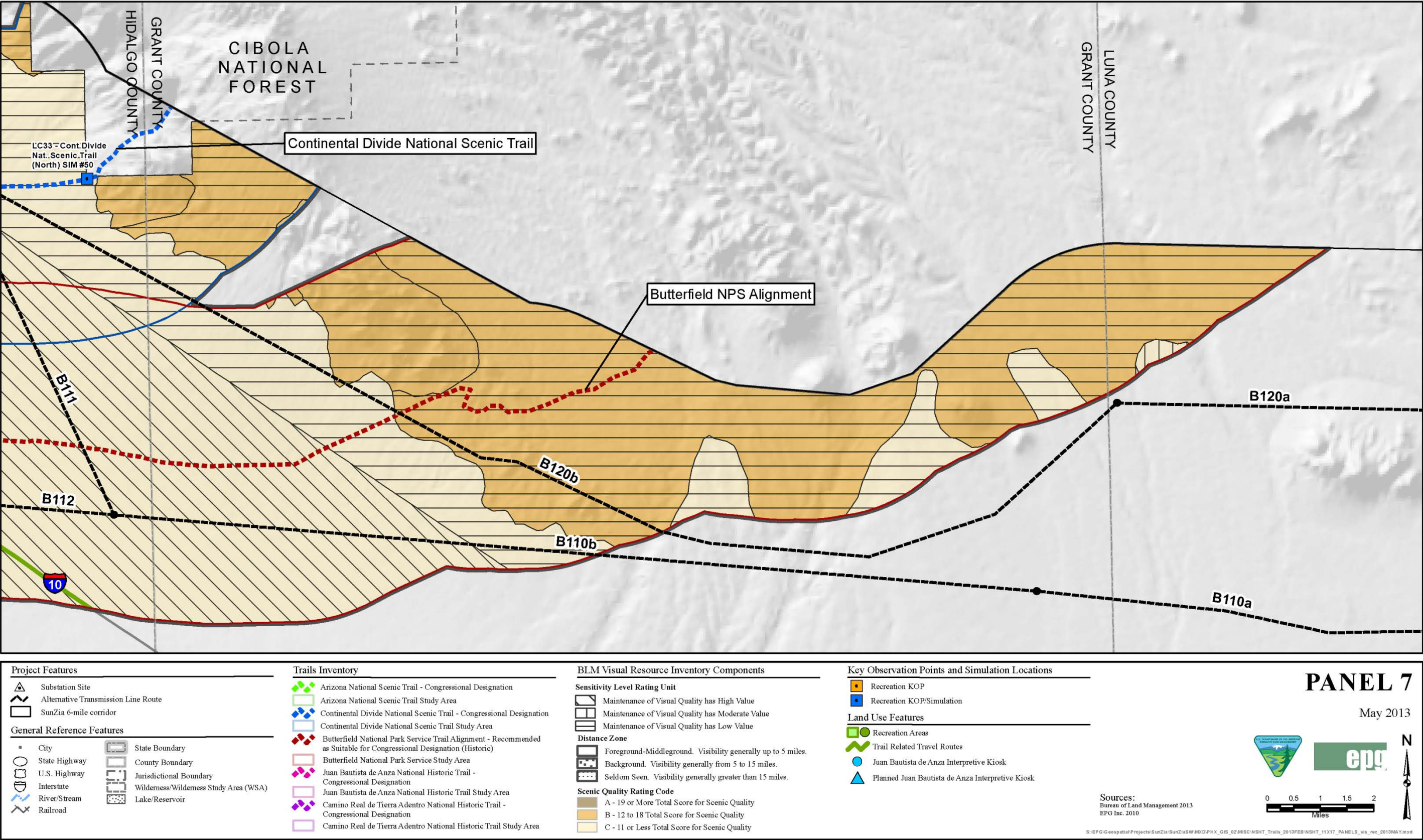


Figure L-9. Detailed trail inventory for visual and recreation resources (Panel 8)

This page intentionally left blank.

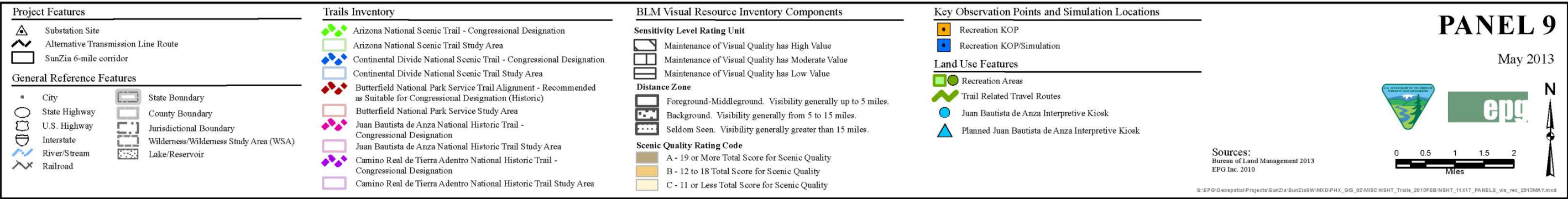
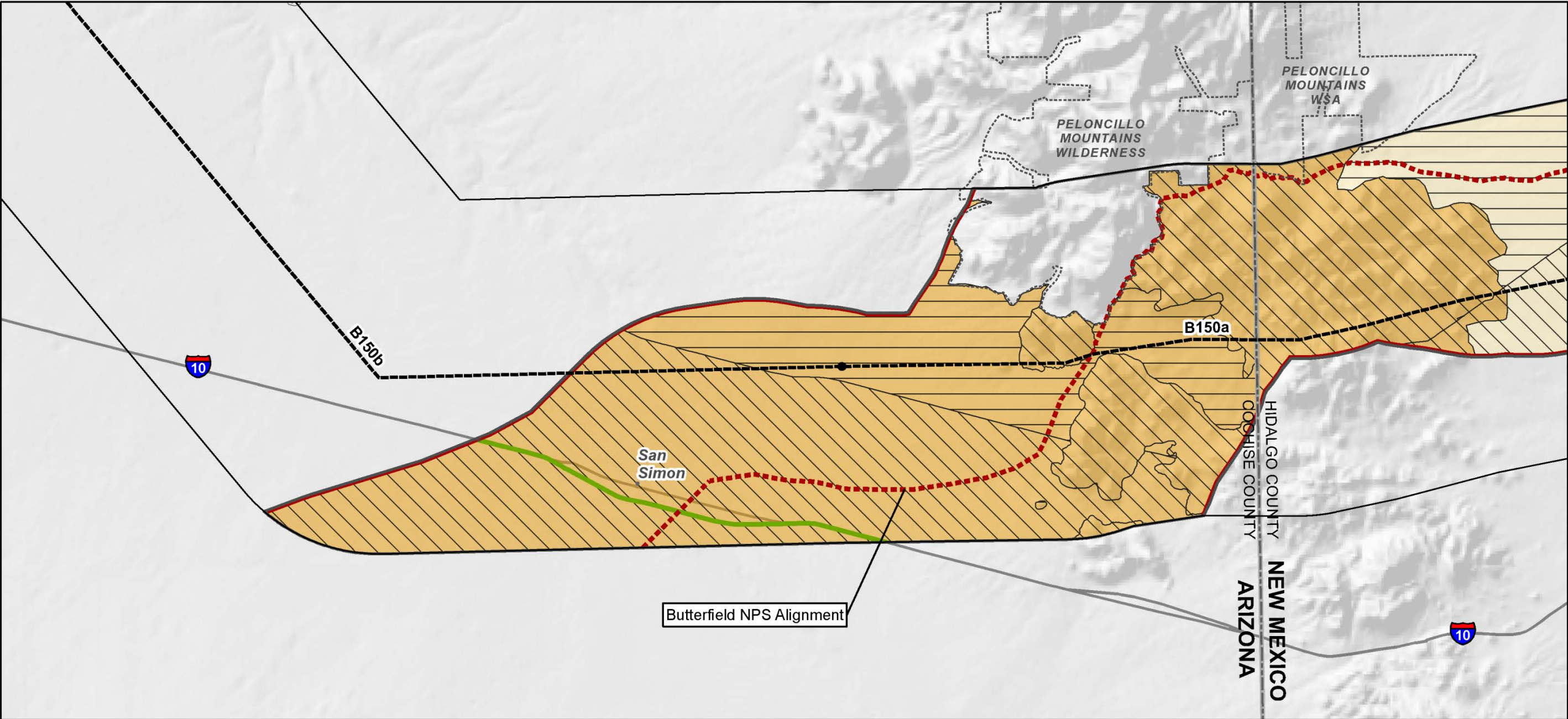


Figure L-10. Detailed trail inventory for visual and recreation resources (Panel 9)

This page intentionally left blank.

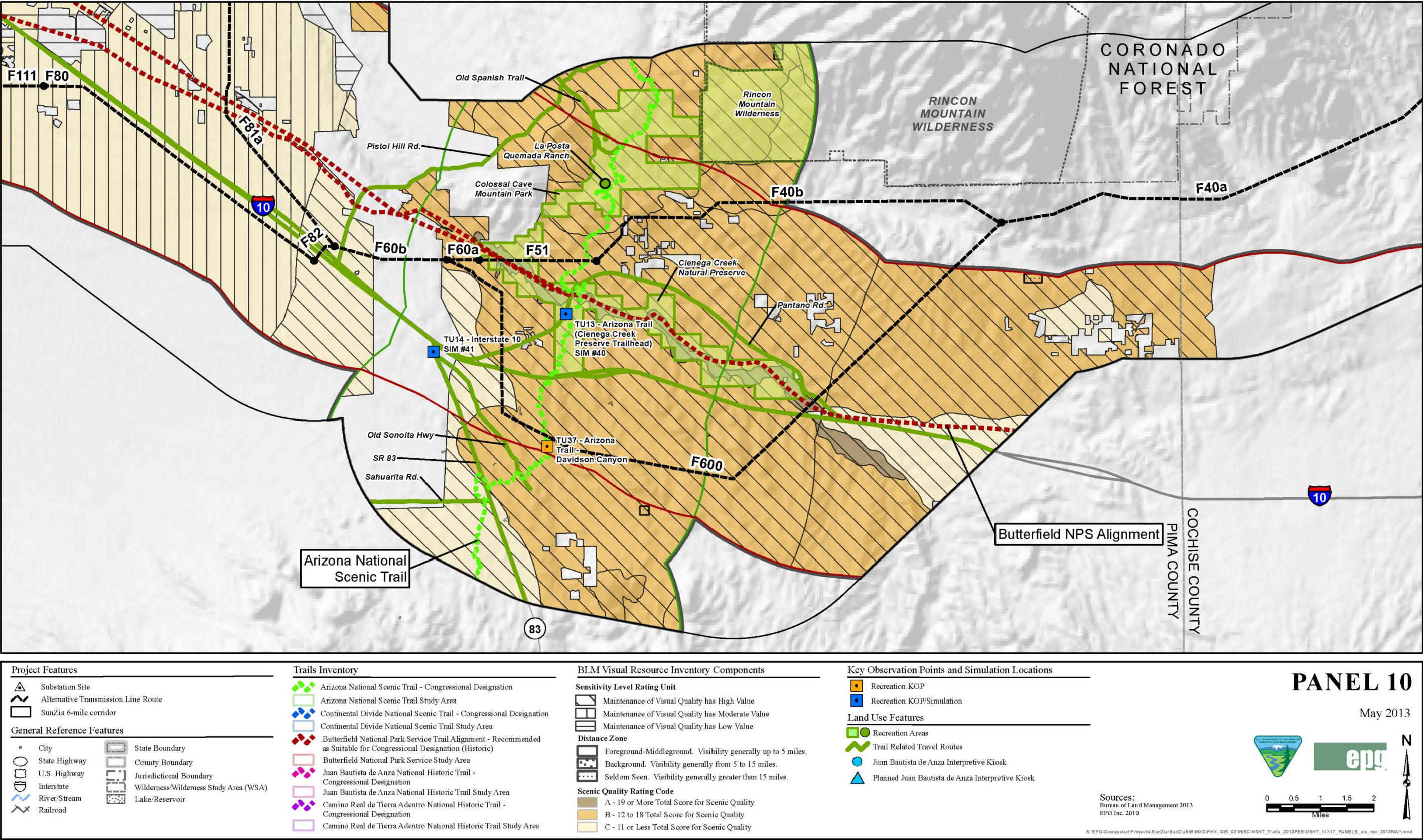


Figure L-11. Detailed trail inventory for visual and recreation resources (Panel 10)

This page intentionally left blank.

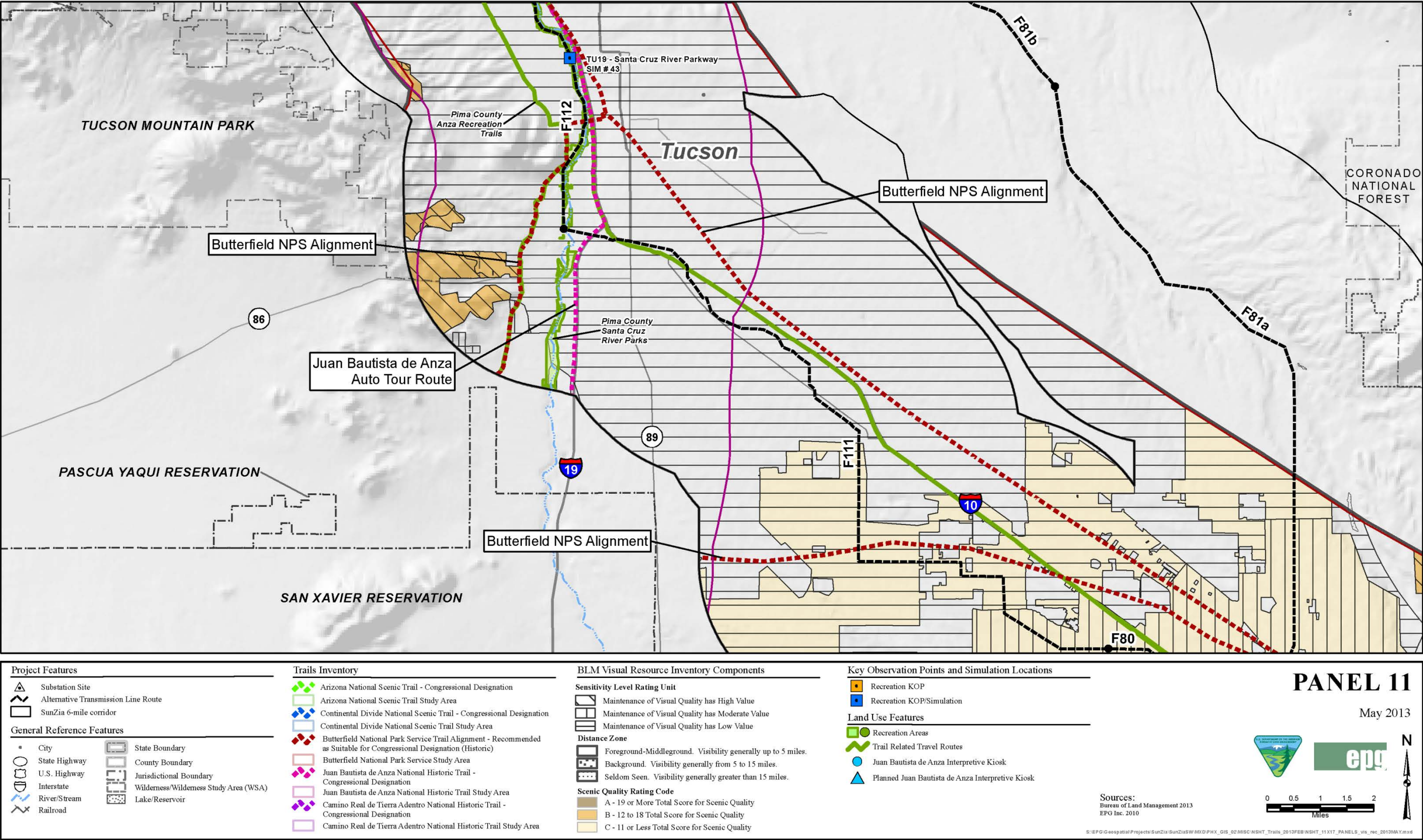


Figure L-12. Detailed trail inventory for visual and recreation resources (Panel 11)

This page intentionally left blank.

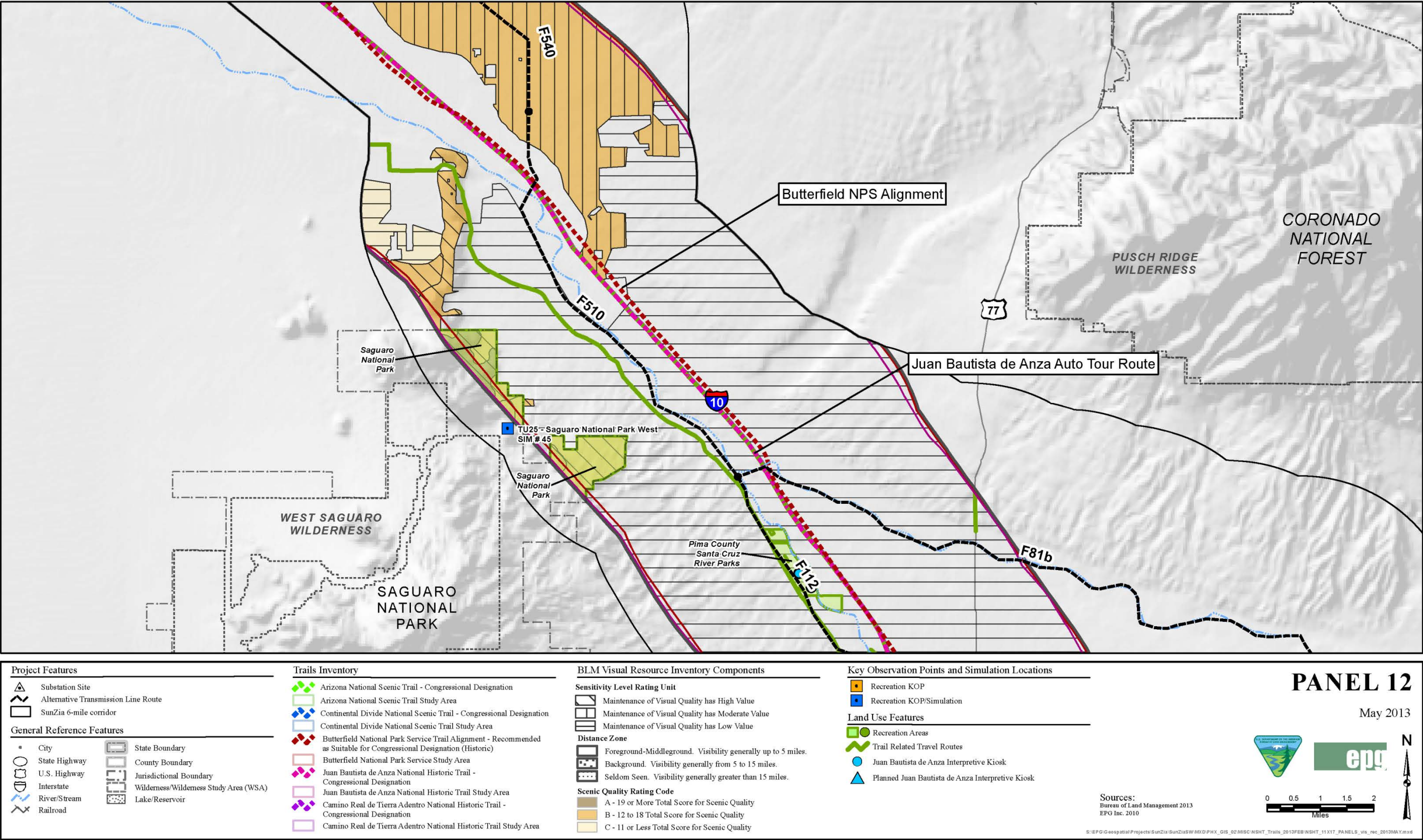


Figure L-13. Detailed trail inventory for visual and recreation resources (Panel 12)

This page intentionally left blank.

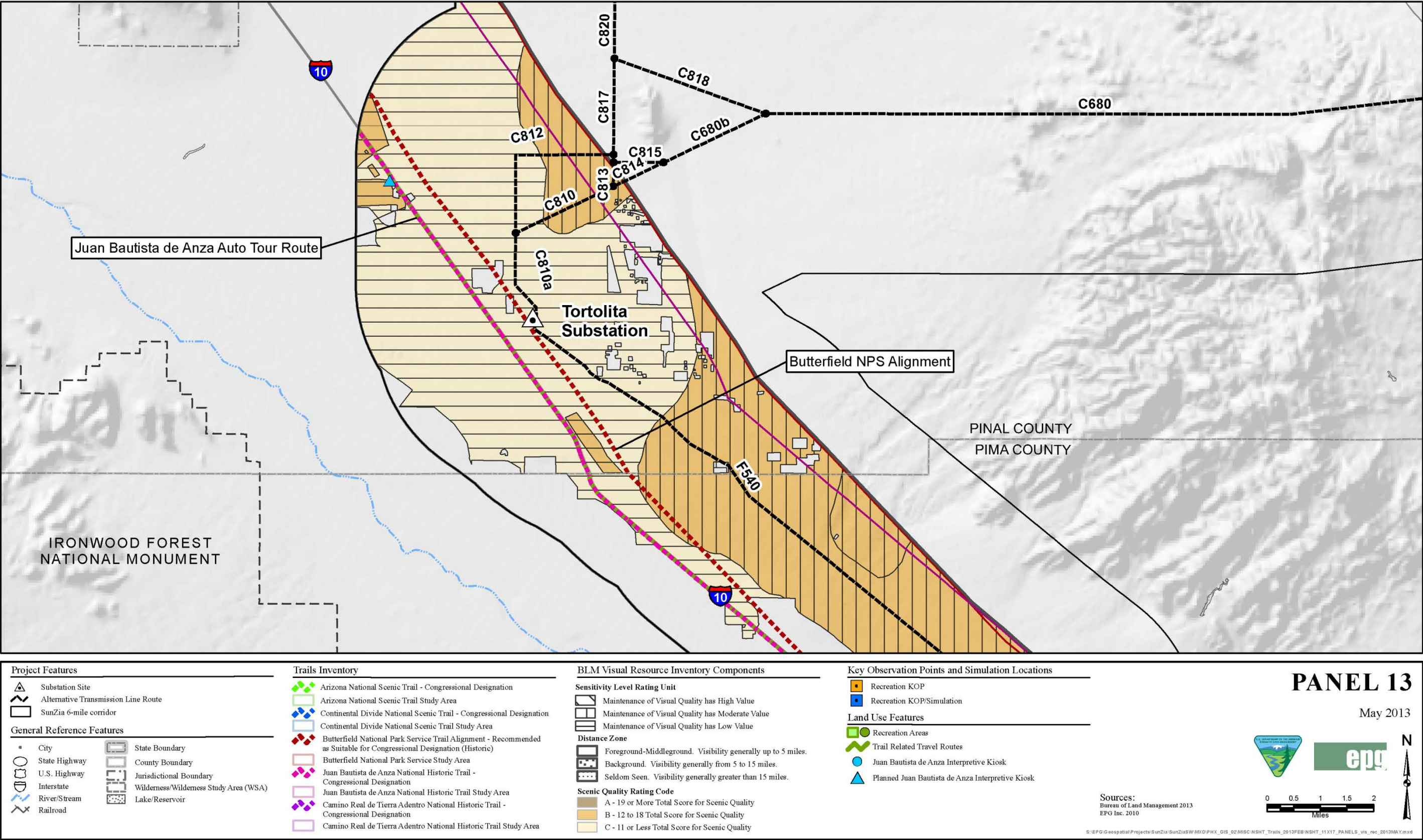


Figure L-14. Detailed trail inventory for visual and recreation resources (Panel 13)

This page intentionally left blank.

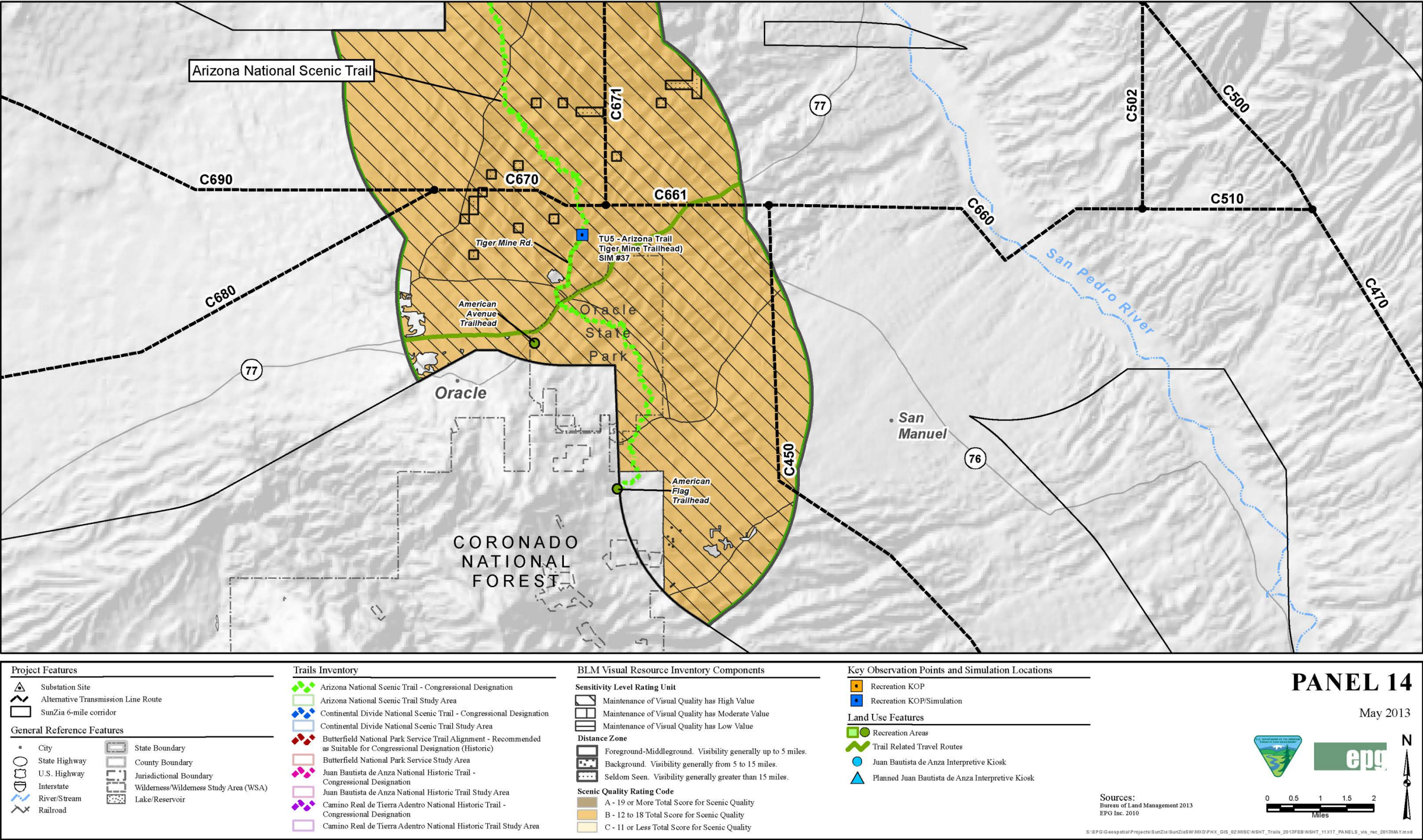


Figure L-15. Detailed trail inventory for visual and recreation resources (Panel 14)

This page intentionally left blank.

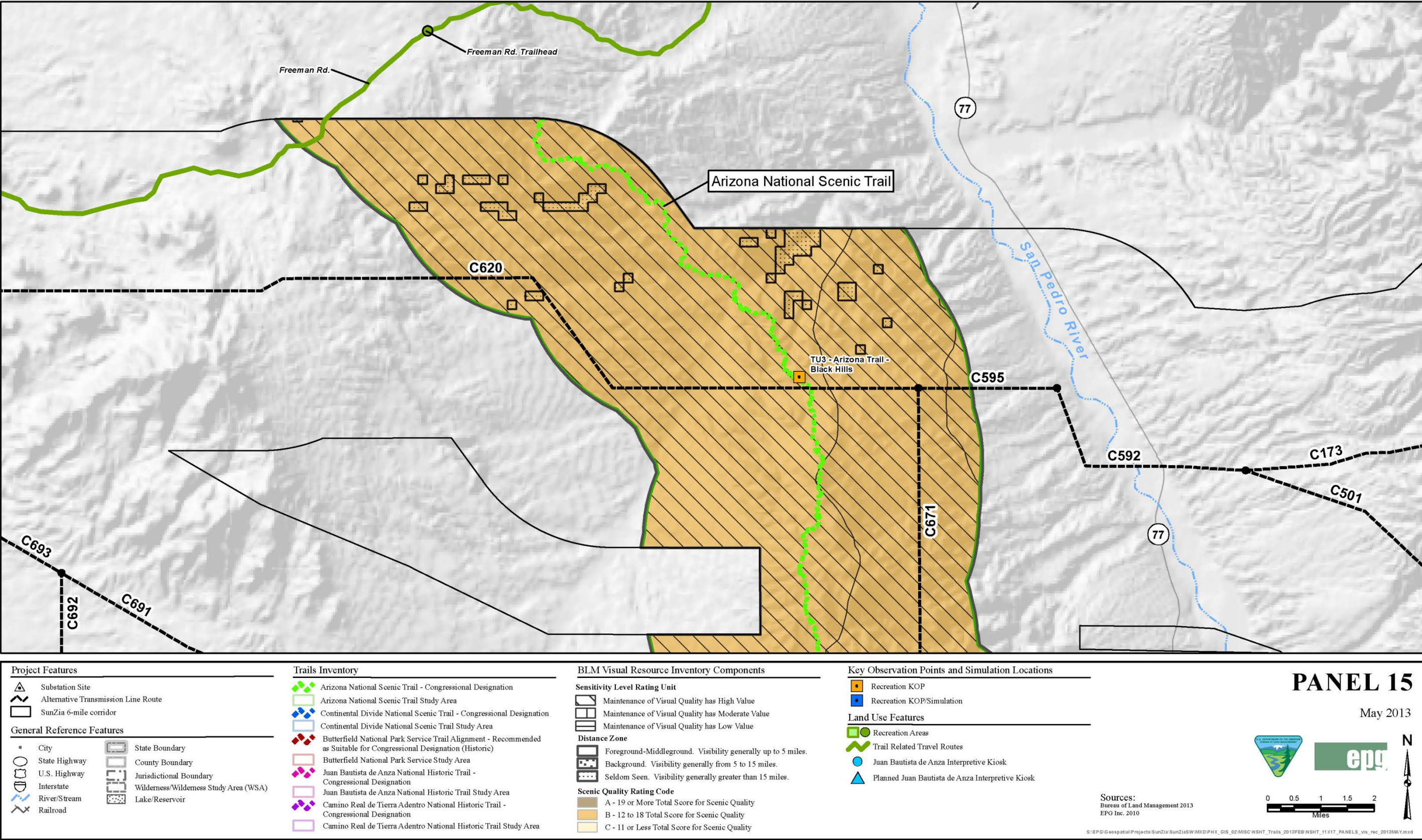


Figure L-16. Detailed trail inventory for visual and recreation resources (Panel 15)

This page intentionally left blank.

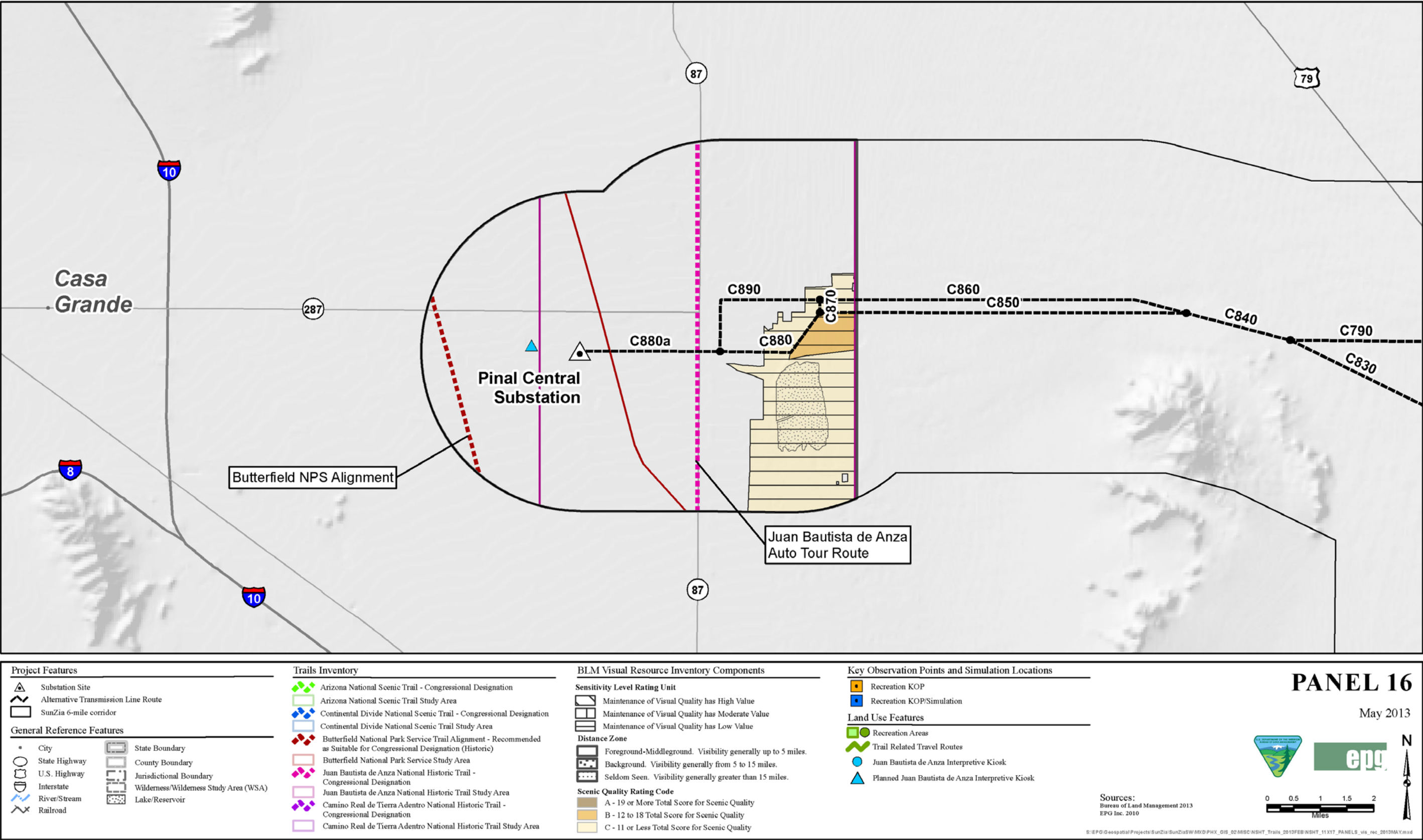


Figure L-17. Detailed trail inventory for visual and recreation resources (Panel 16)

This page intentionally left blank.

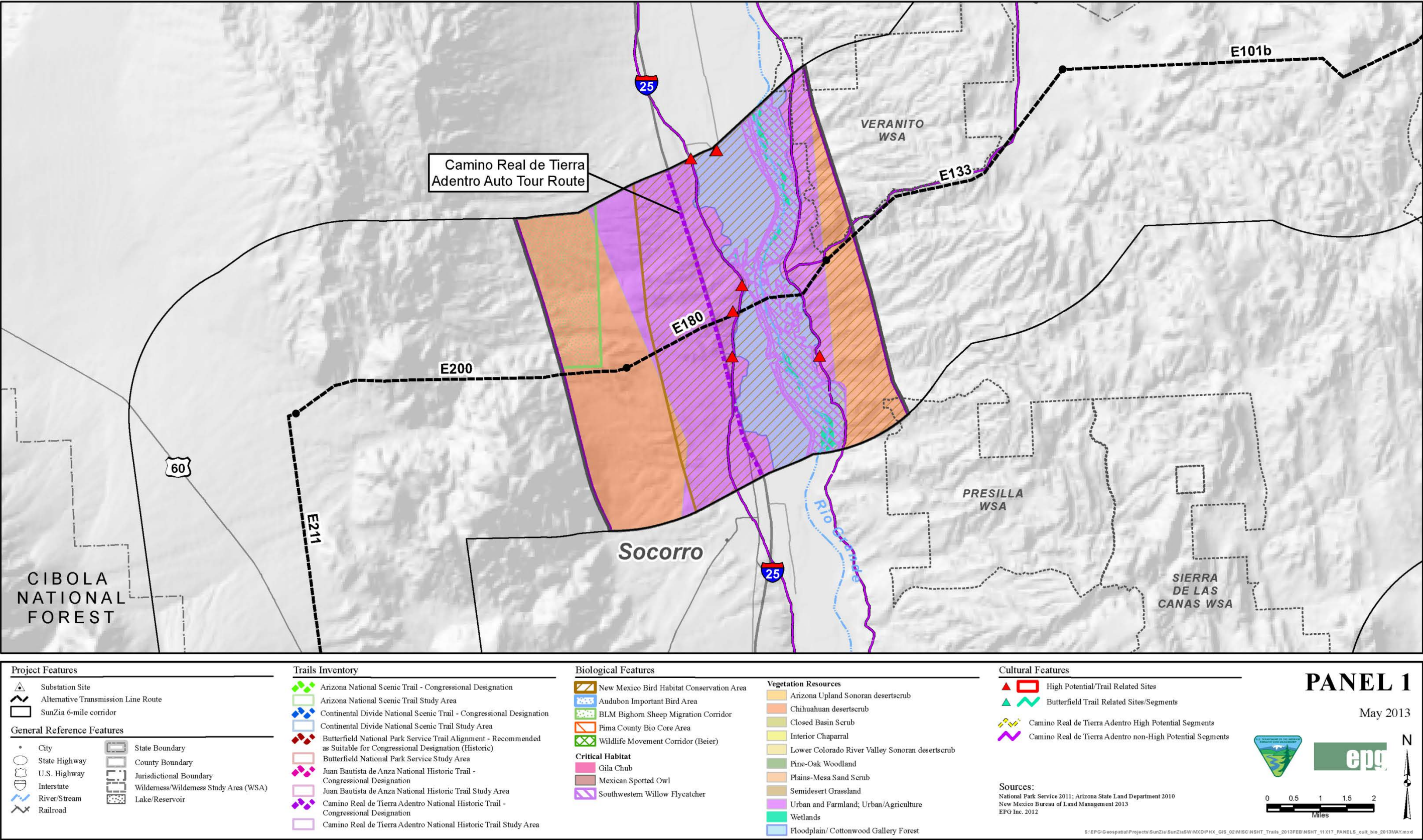


Figure L-18. Detailed trail inventory for cultural, biological, and other natural resources (Panel 1)

This page intentionally left blank.

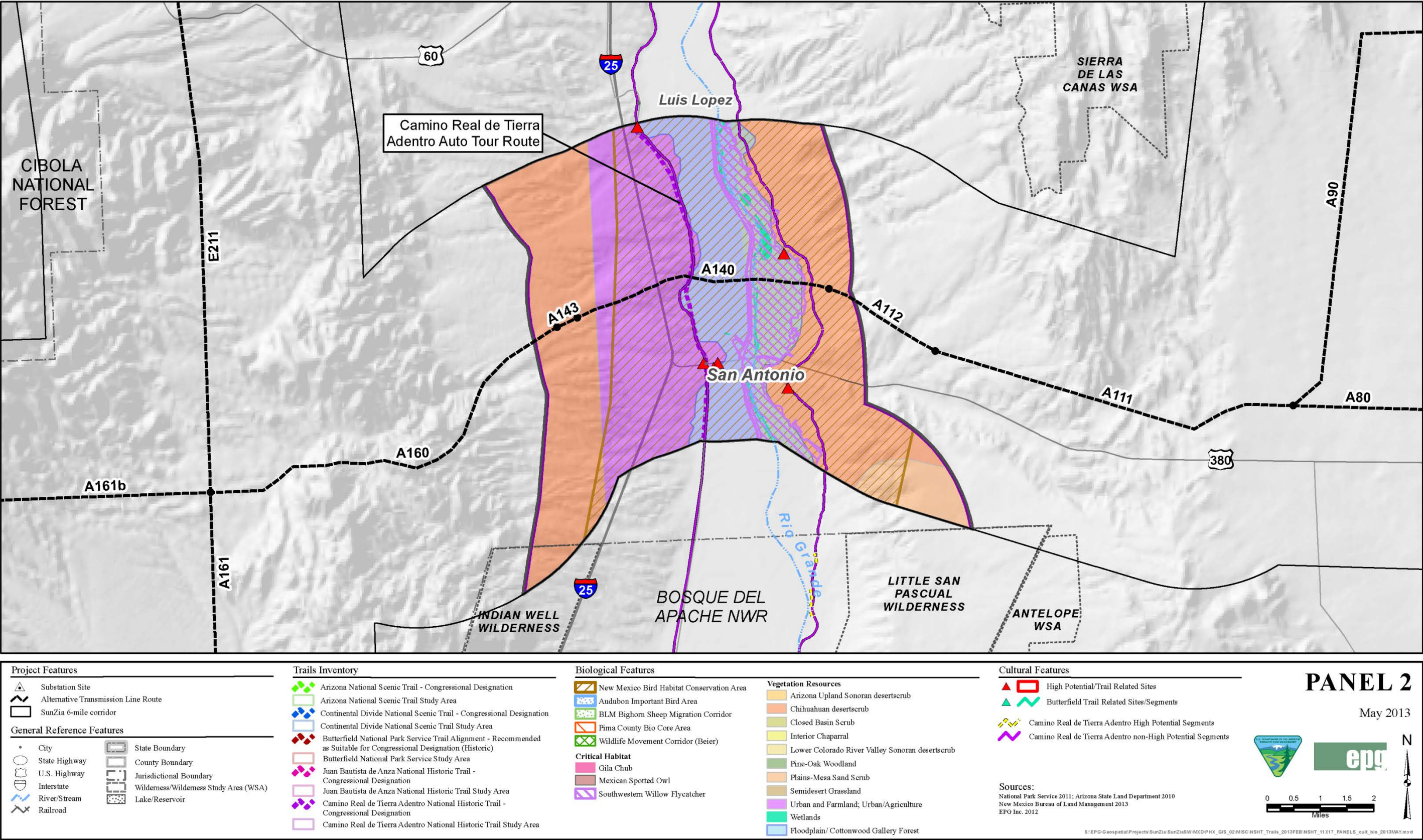


Figure L-19. Detailed trail inventory for cultural, biological, and other natural resources (Panel 2)

This page intentionally left blank.

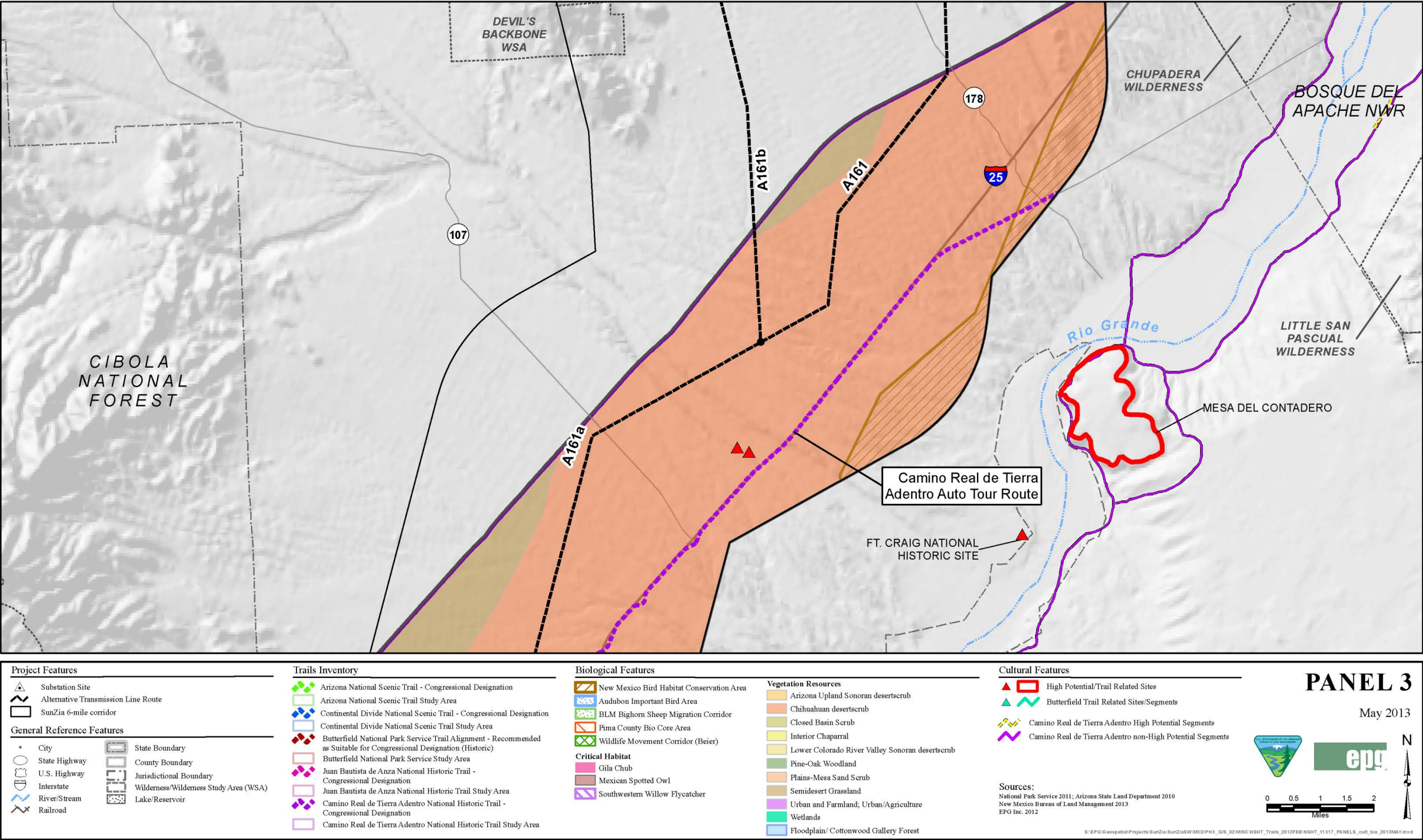


Figure L-20. Detailed trail inventory for cultural, biological, and other natural resources (Panel 3)

This page intentionally left blank.

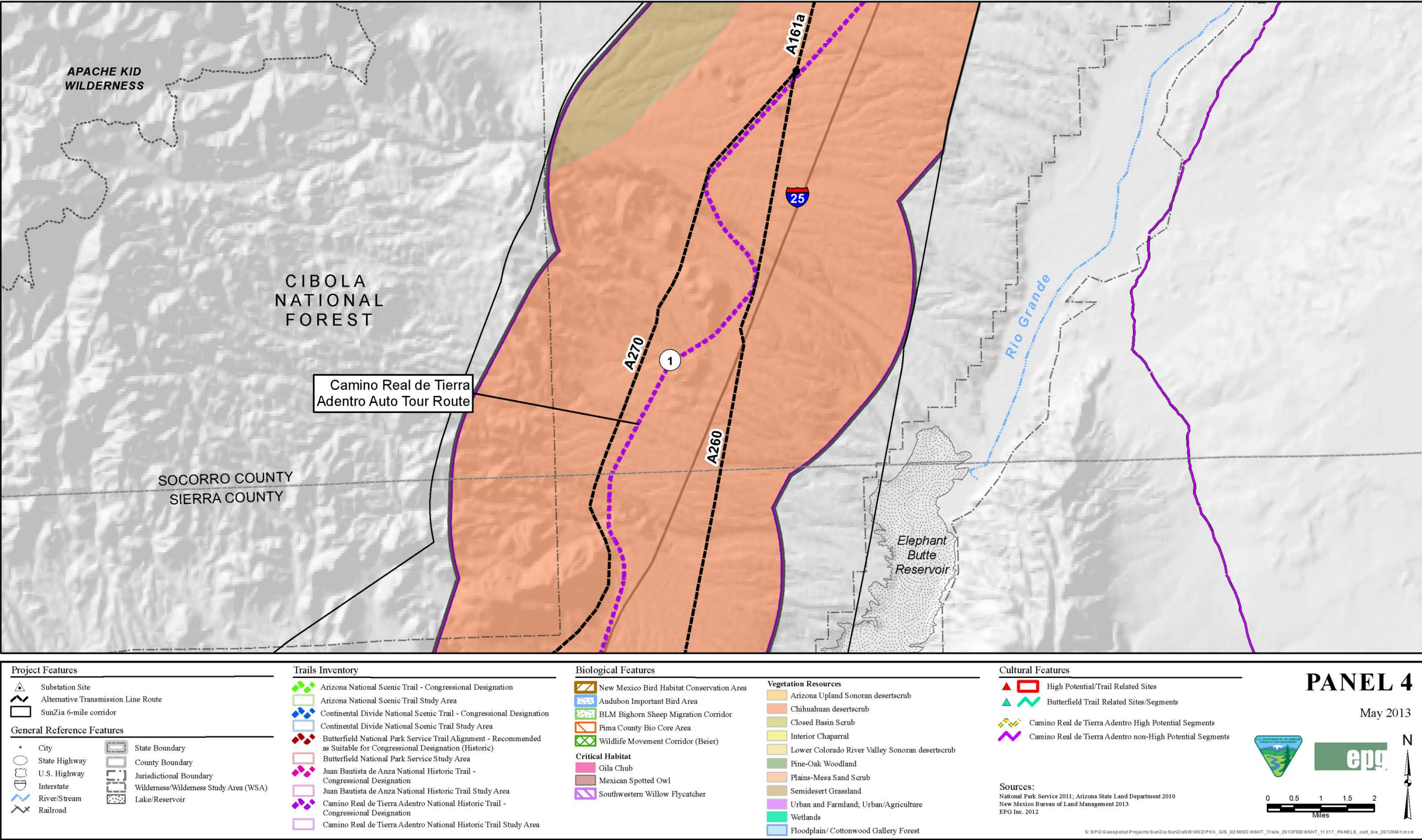


Figure L-21. Detailed trail inventory for cultural, biological, and other natural resources (Panel 4)

This page intentionally left blank.

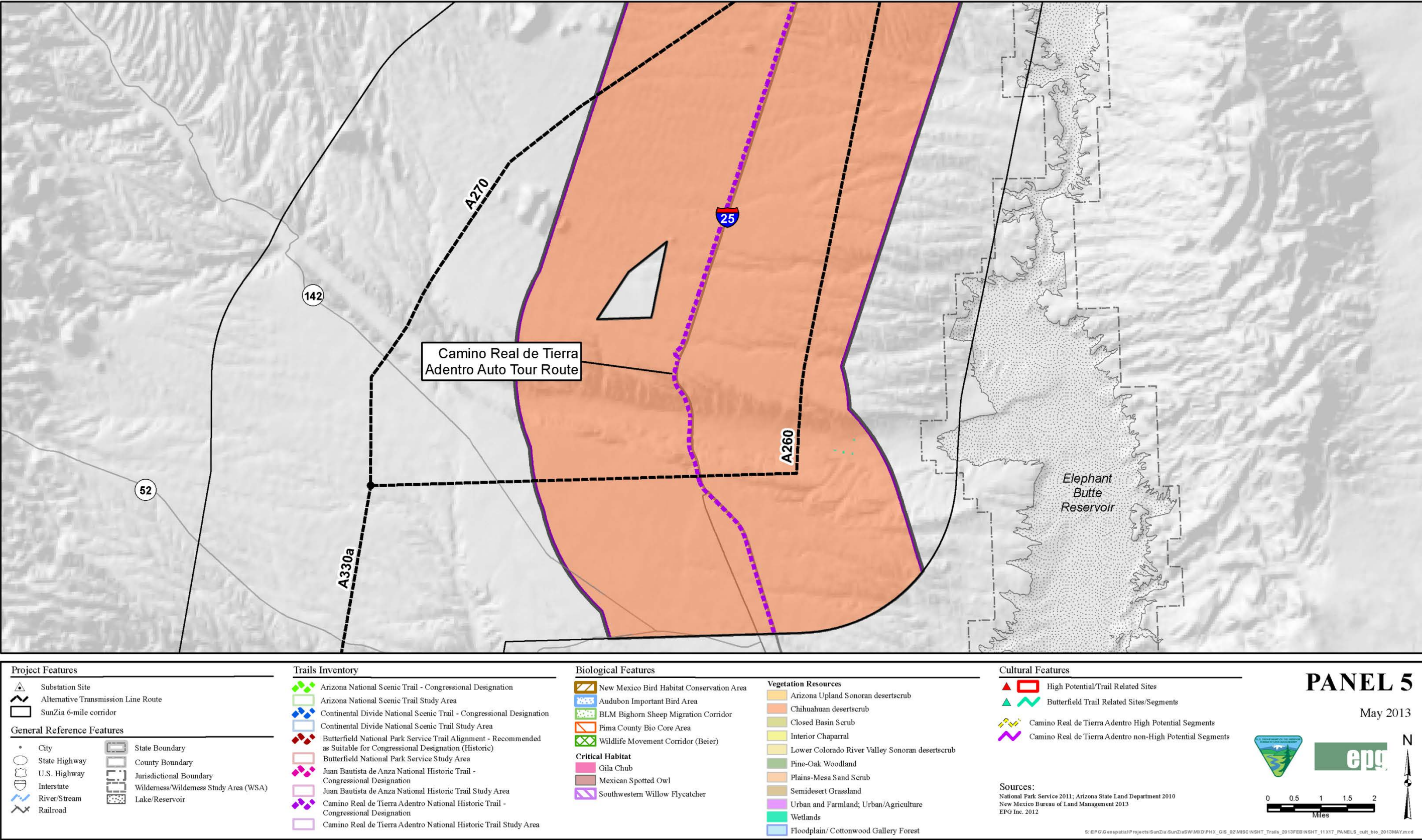


Figure L-22. Detailed trail inventory for cultural, biological, and other natural resources (Panel 5)

This page intentionally left blank.

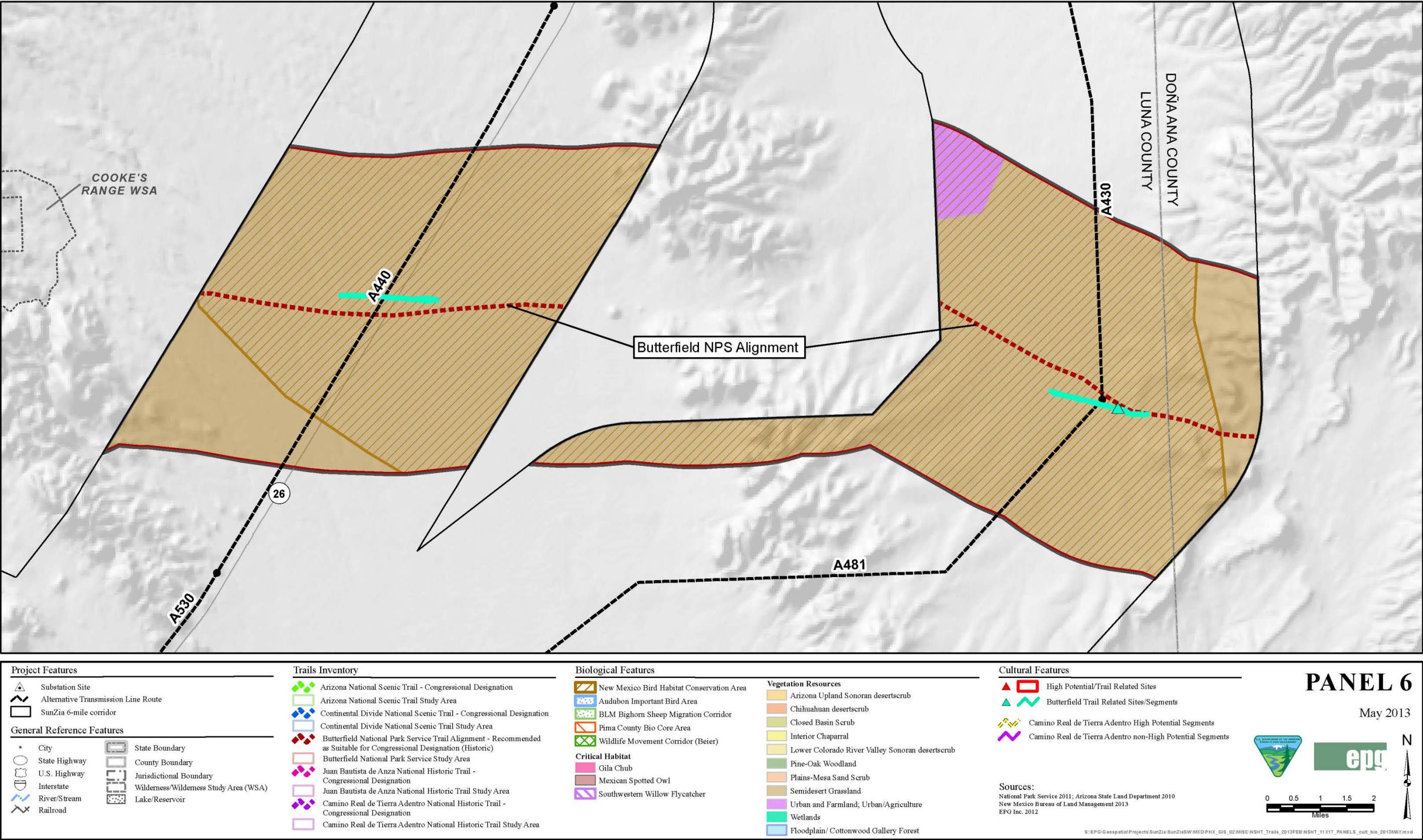


Figure L-23. Detailed trail inventory for cultural, biological, and other natural resources (Panel 6)

This page intentionally left blank.

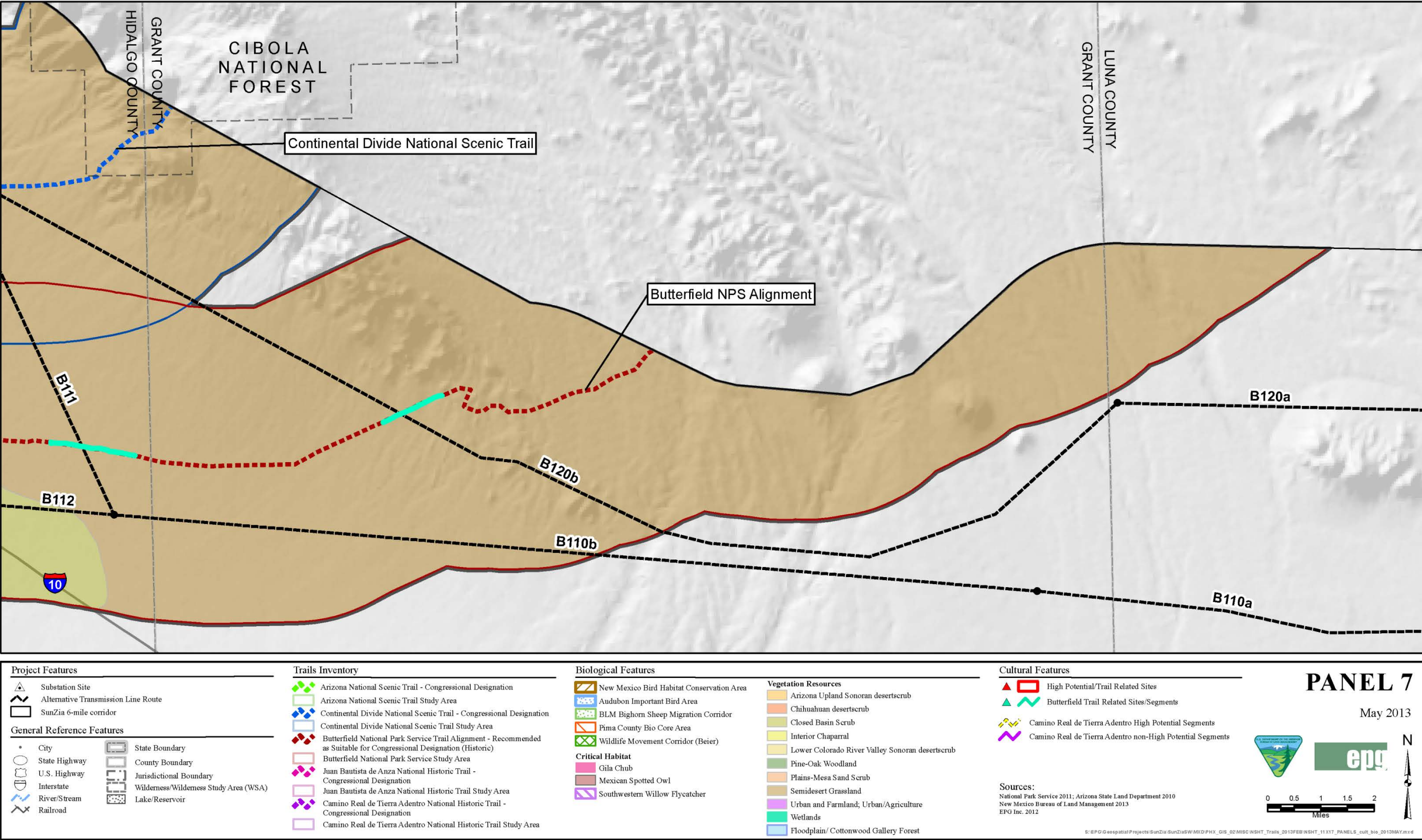


Figure L-24. Detailed trail inventory for cultural, biological, and other natural resources (Panel 7)

This page intentionally left blank.

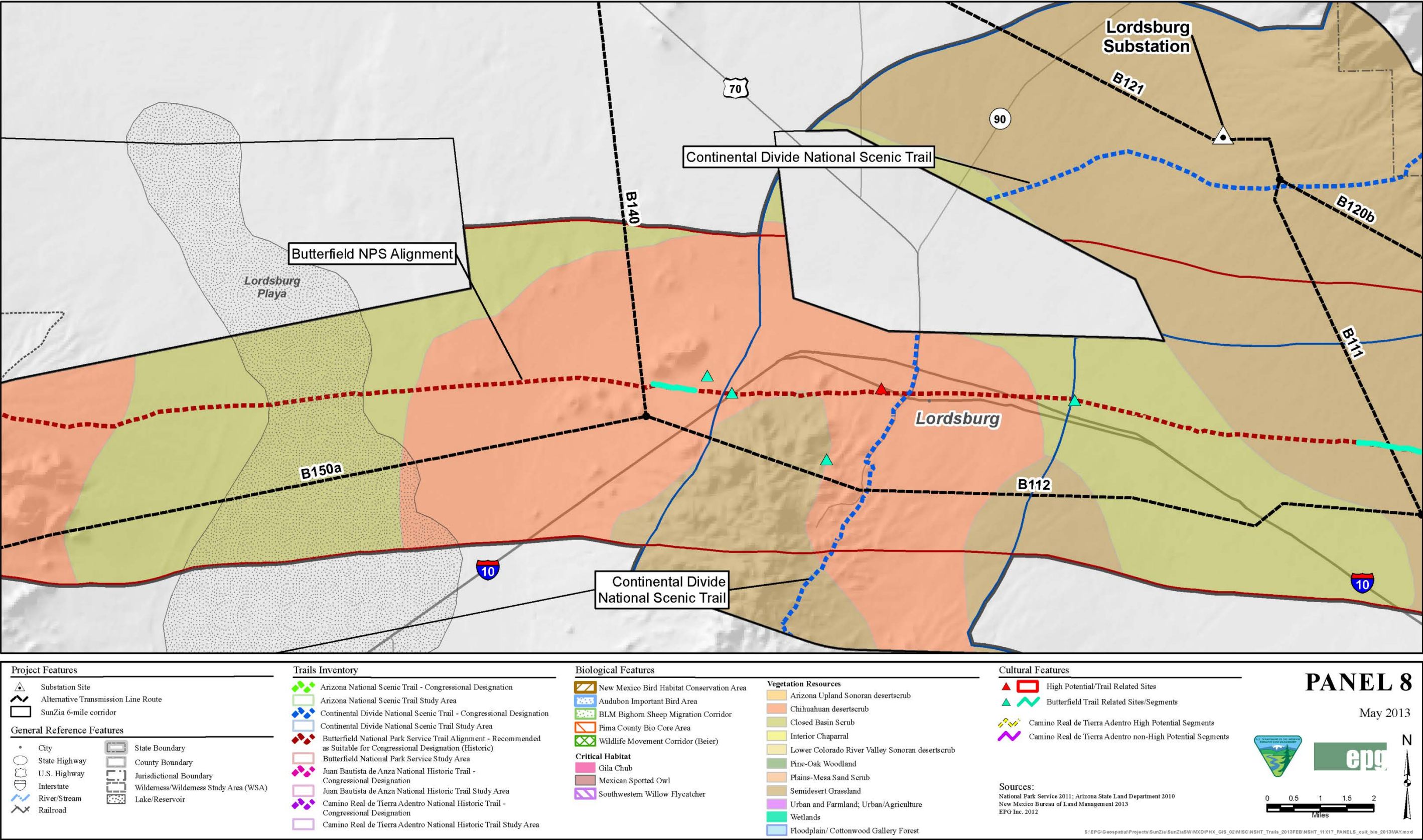


Figure L-25. Detailed trail inventory for cultural, biological, and other natural resources (Panel 8)

This page intentionally left blank.

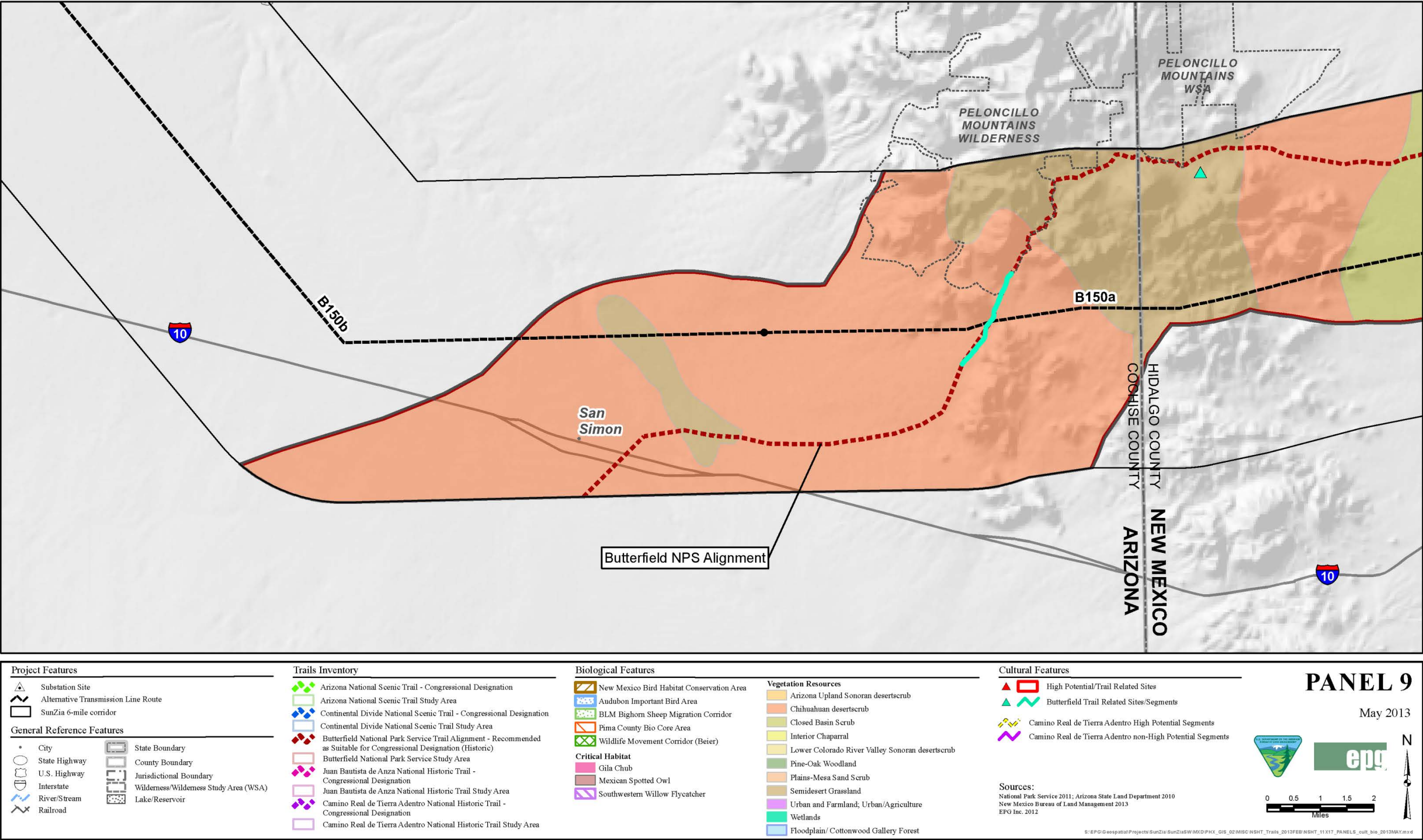


Figure L-26. Detailed trail inventory for cultural, biological, and other natural resources (Panel 9)

This page intentionally left blank.

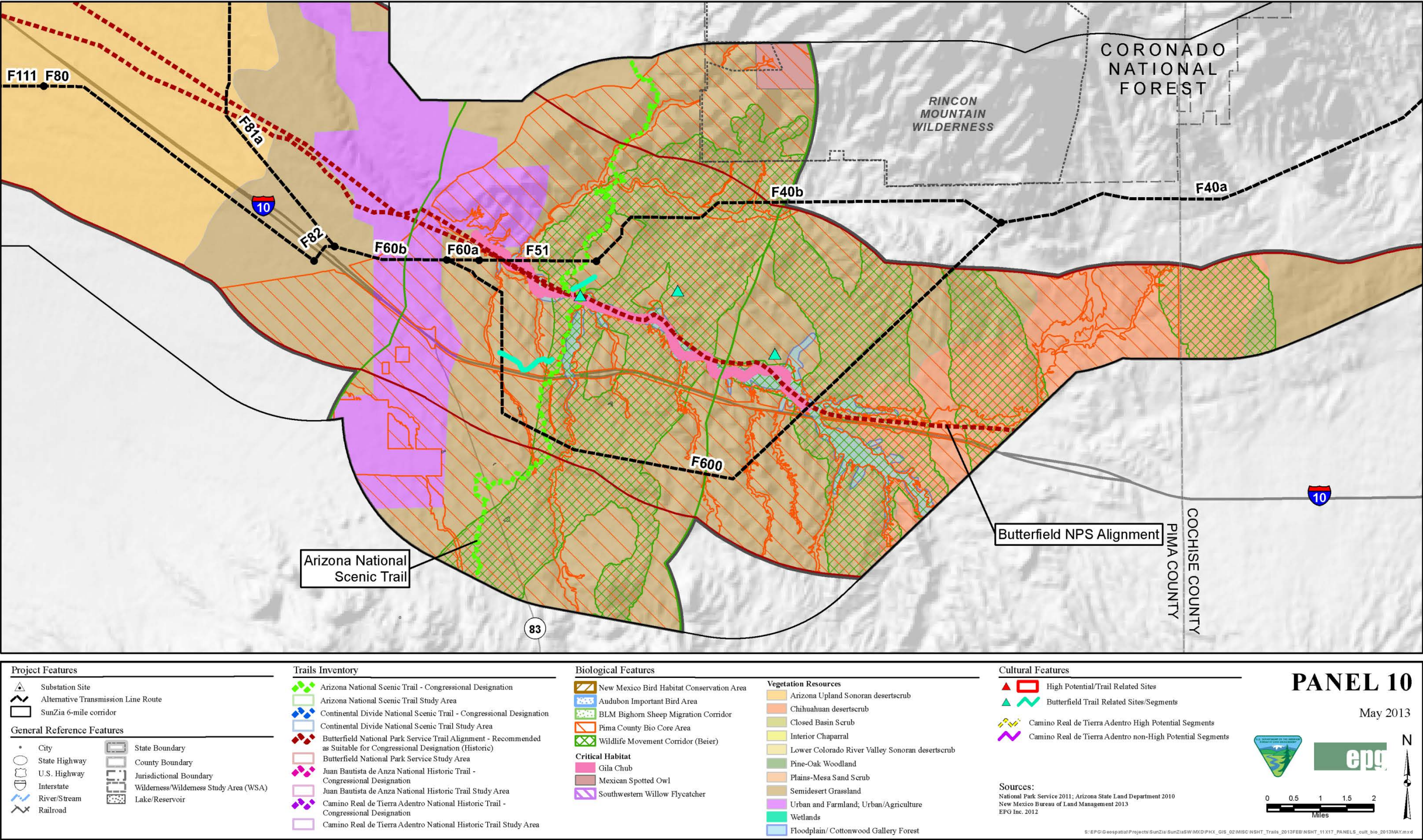


Figure L-27. Detailed trail inventory for cultural, biological, and other natural resources (Panel 10)

This page intentionally left blank.

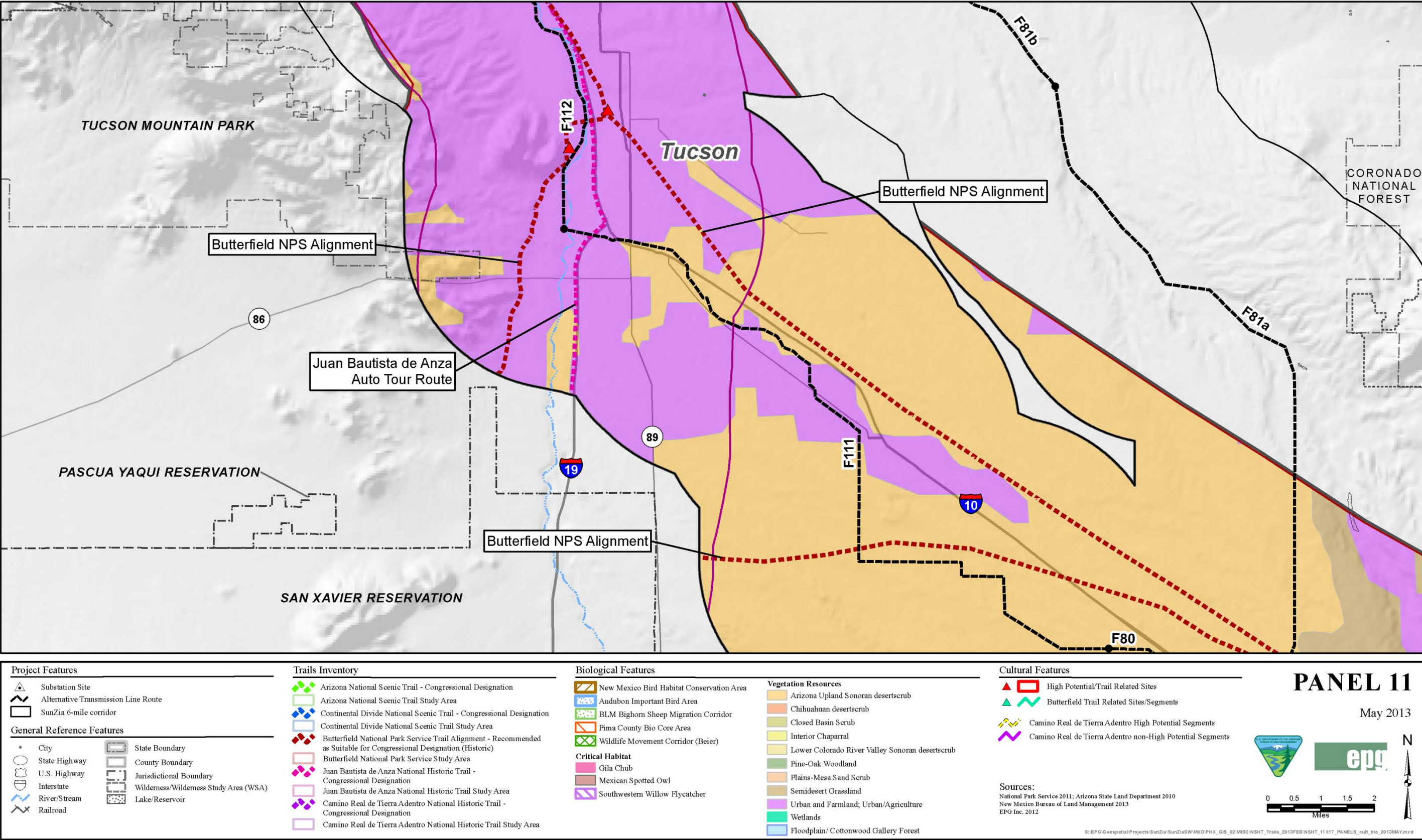


Figure L-28. Detailed trail inventory for cultural, biological, and other natural resources (Panel 11)

This page intentionally left blank.

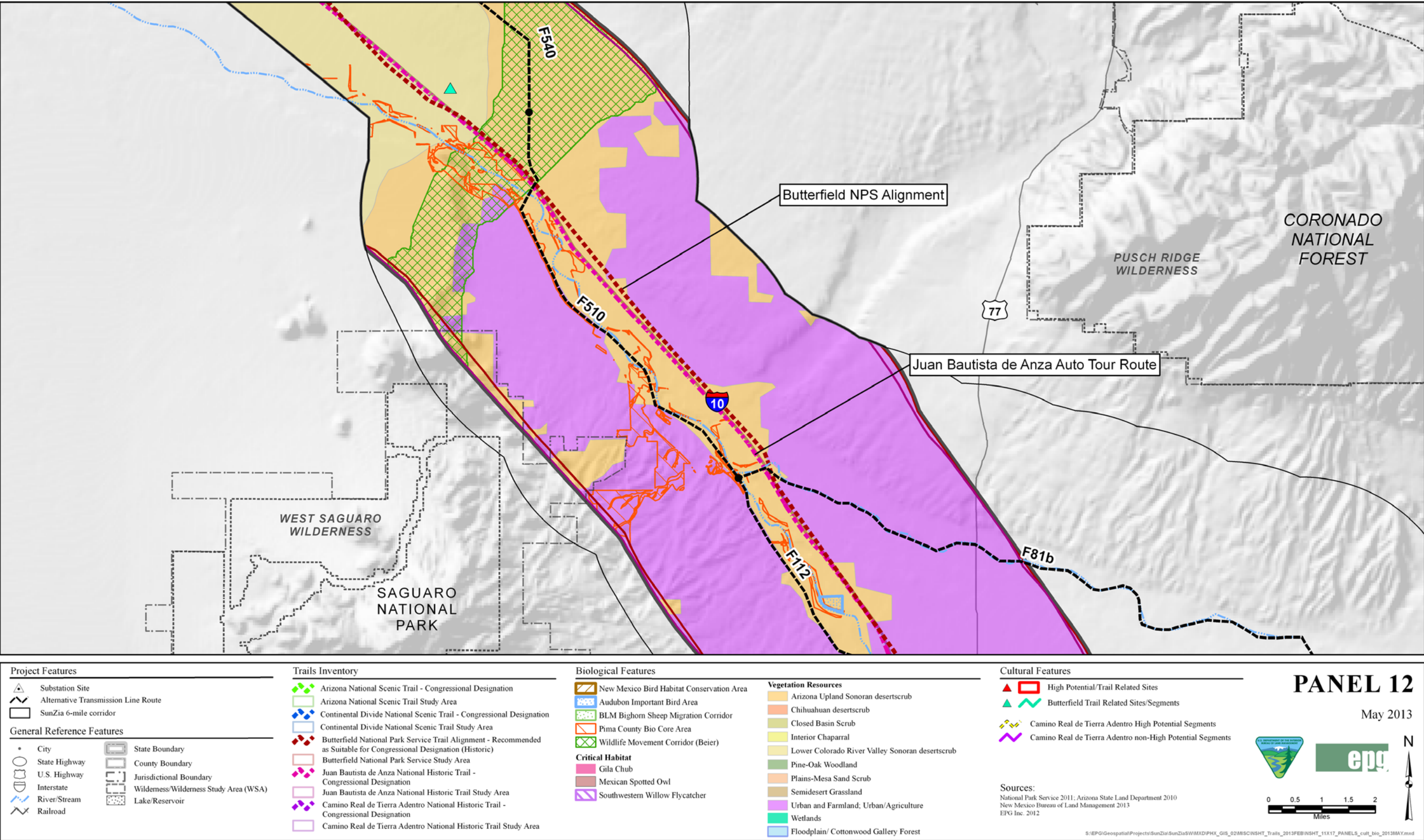


Figure L-29. Detailed trail inventory for cultural, biological, and other natural resources (Panel 12)

This page intentionally left blank.

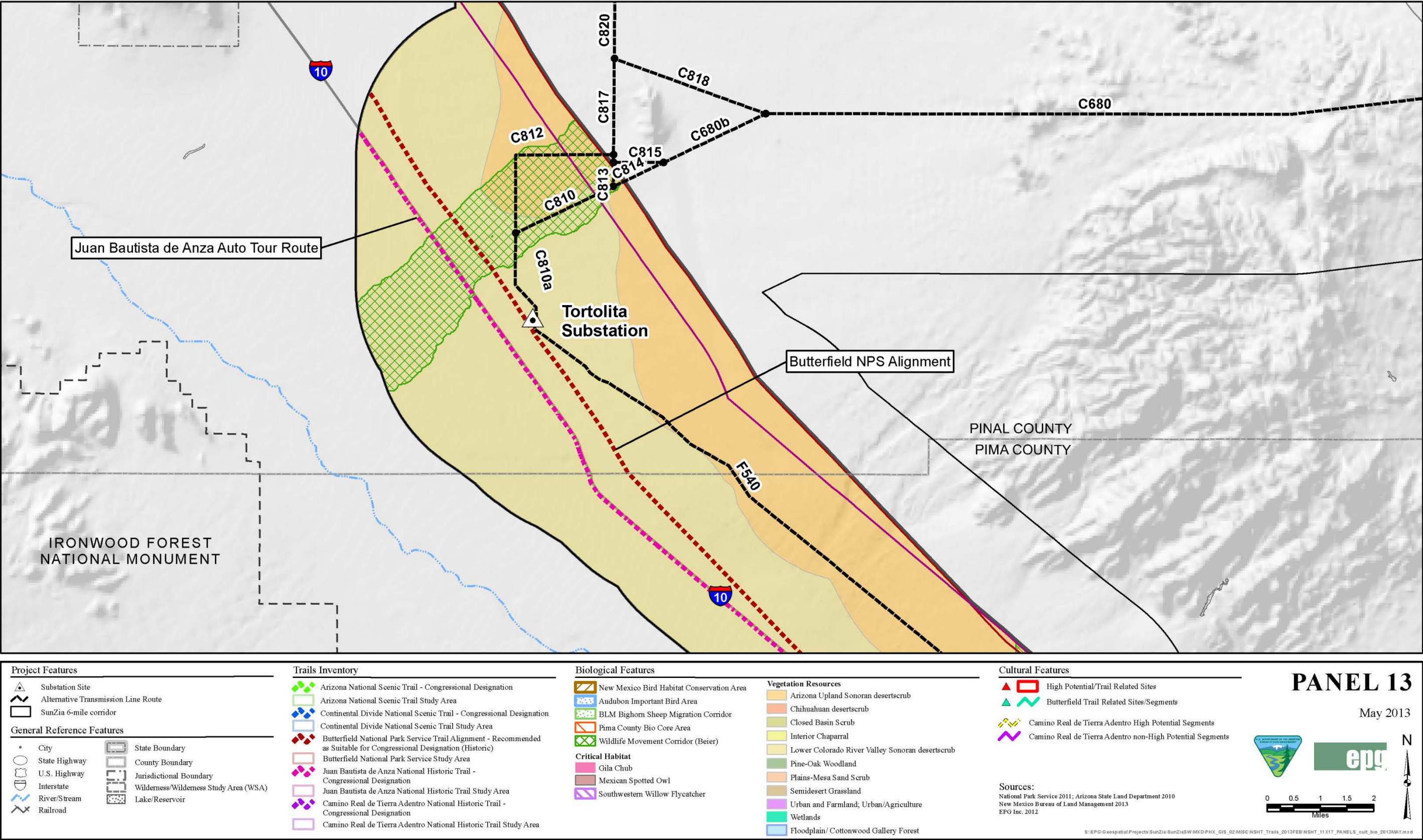


Figure L-30. Detailed trail inventory for cultural, biological, and other natural resources (Panel 13)

This page intentionally left blank.

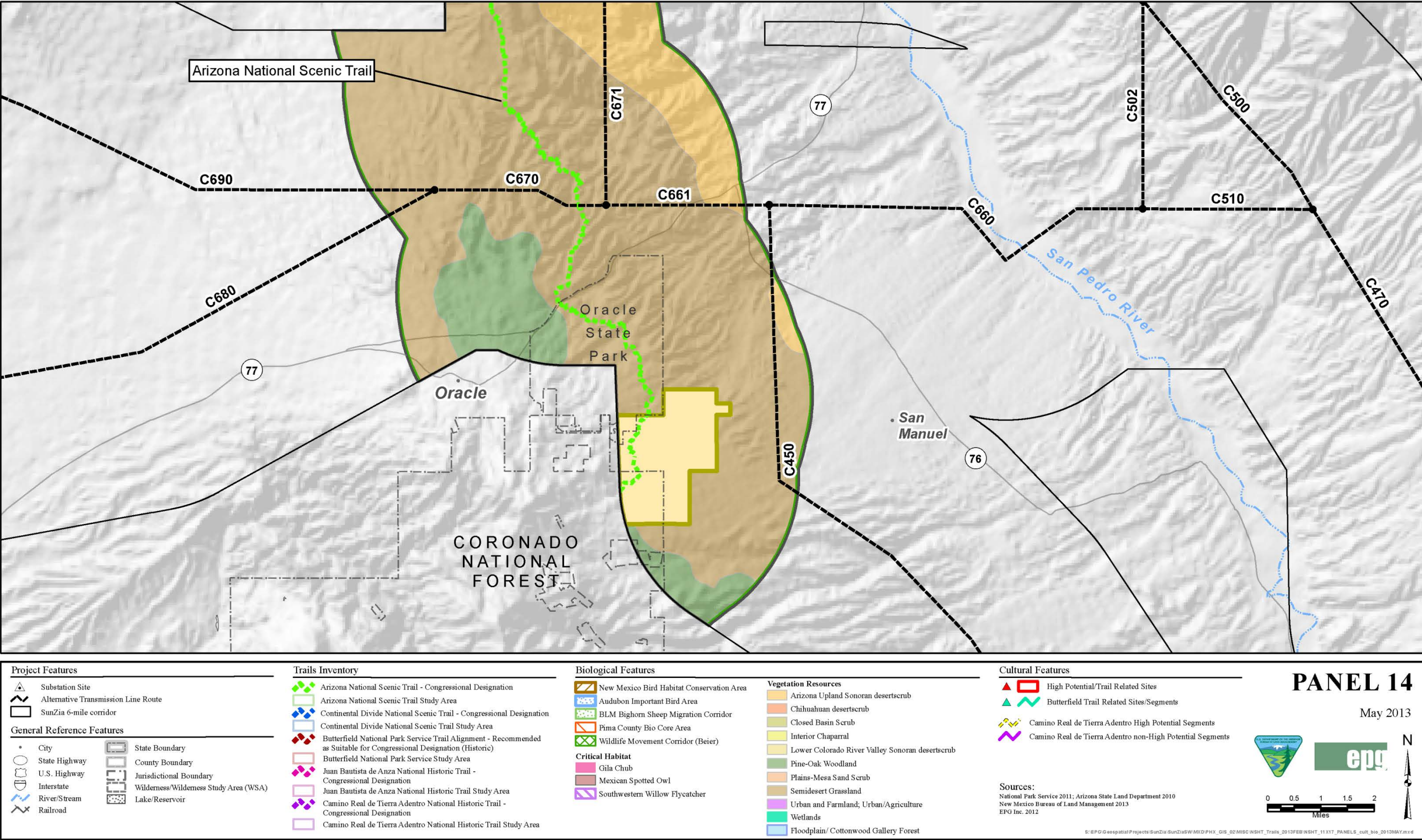


Figure L-31. Detailed trail inventory for cultural, biological, and other natural resources (Panel 14)

This page intentionally left blank.

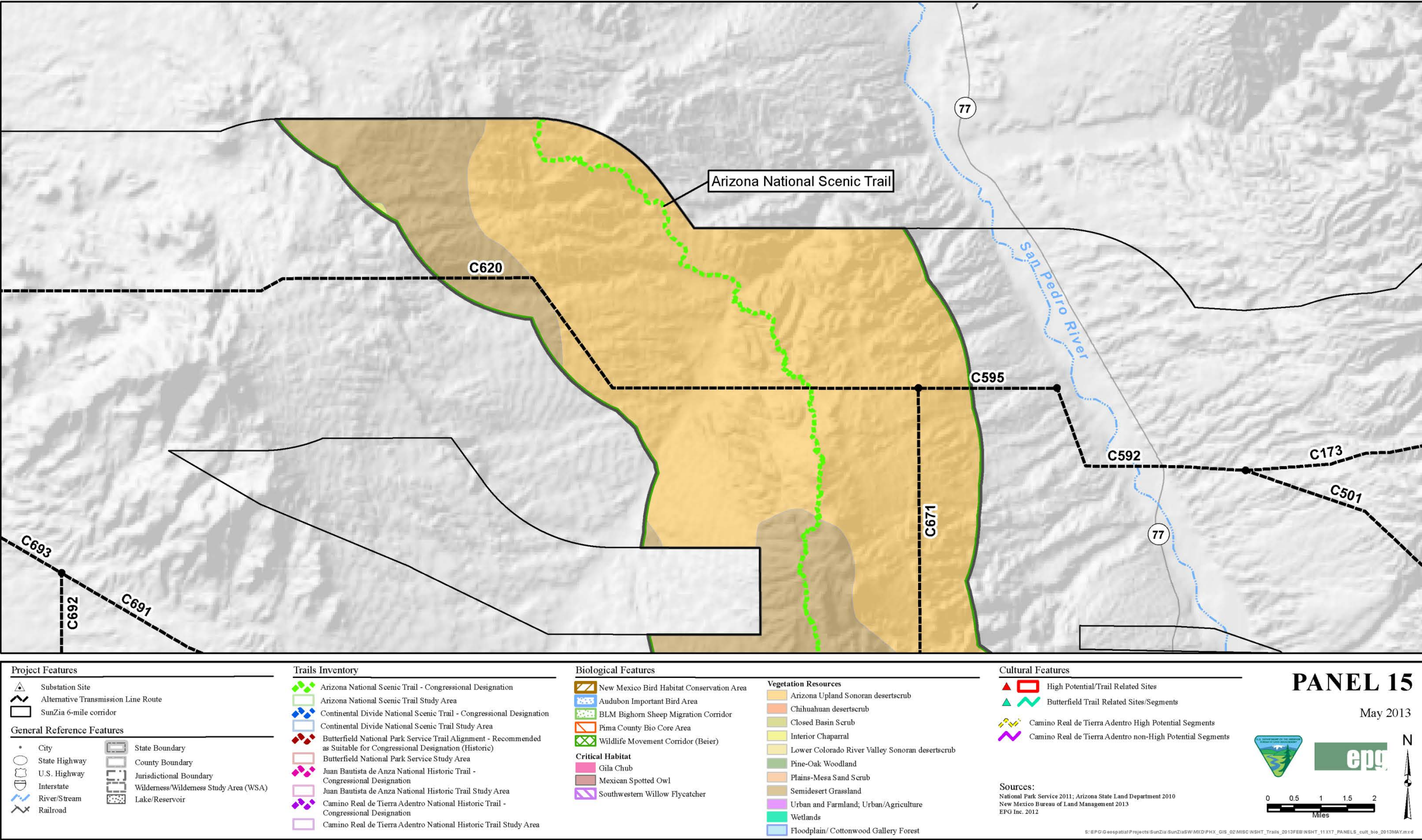


Figure L-32. Detailed trail inventory for cultural, biological, and other natural resources (Panel 15)

This page intentionally left blank.

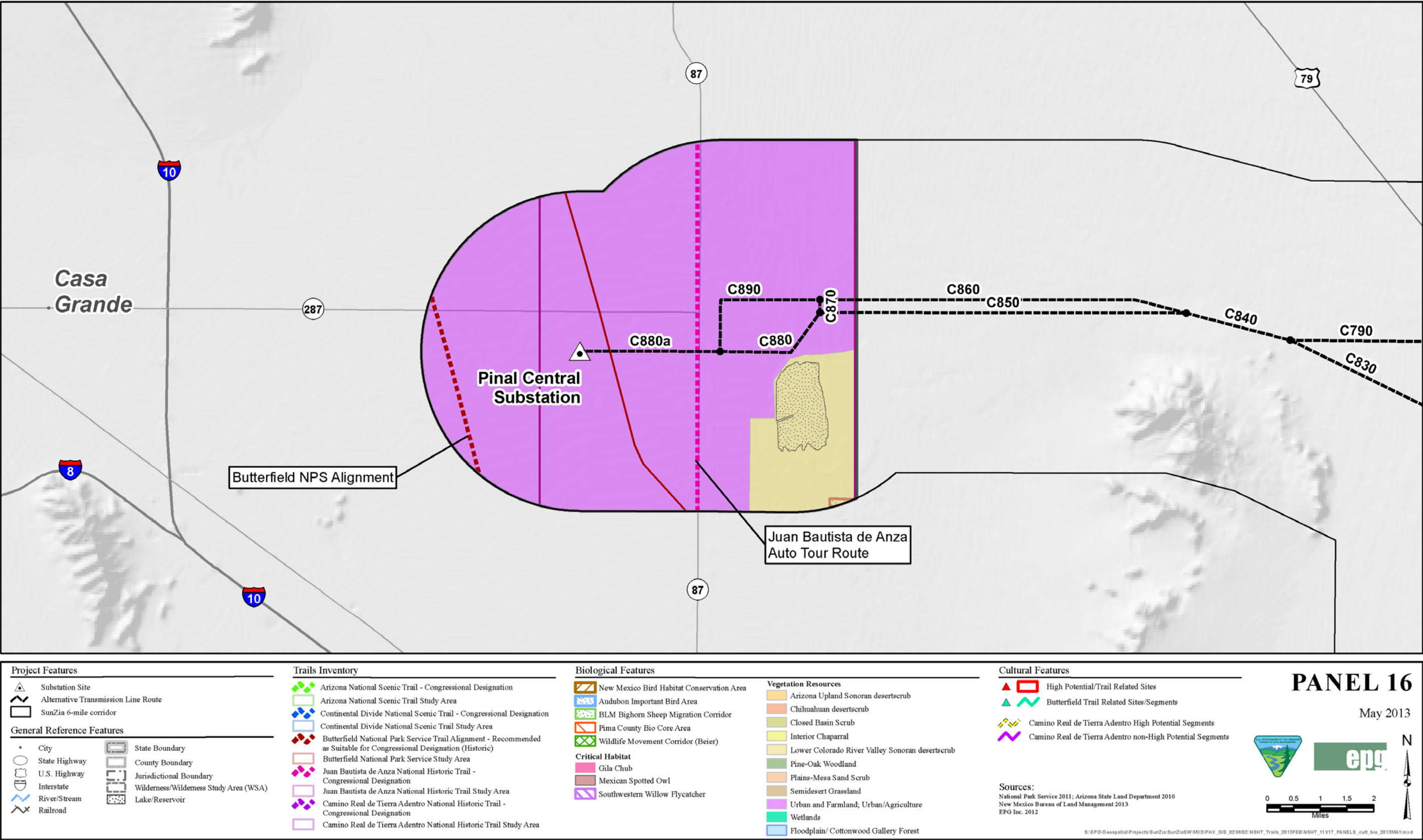


Figure L-33. Detailed trail inventory for cultural, biological, and other natural resources (Panel 16)

This page intentionally left blank.

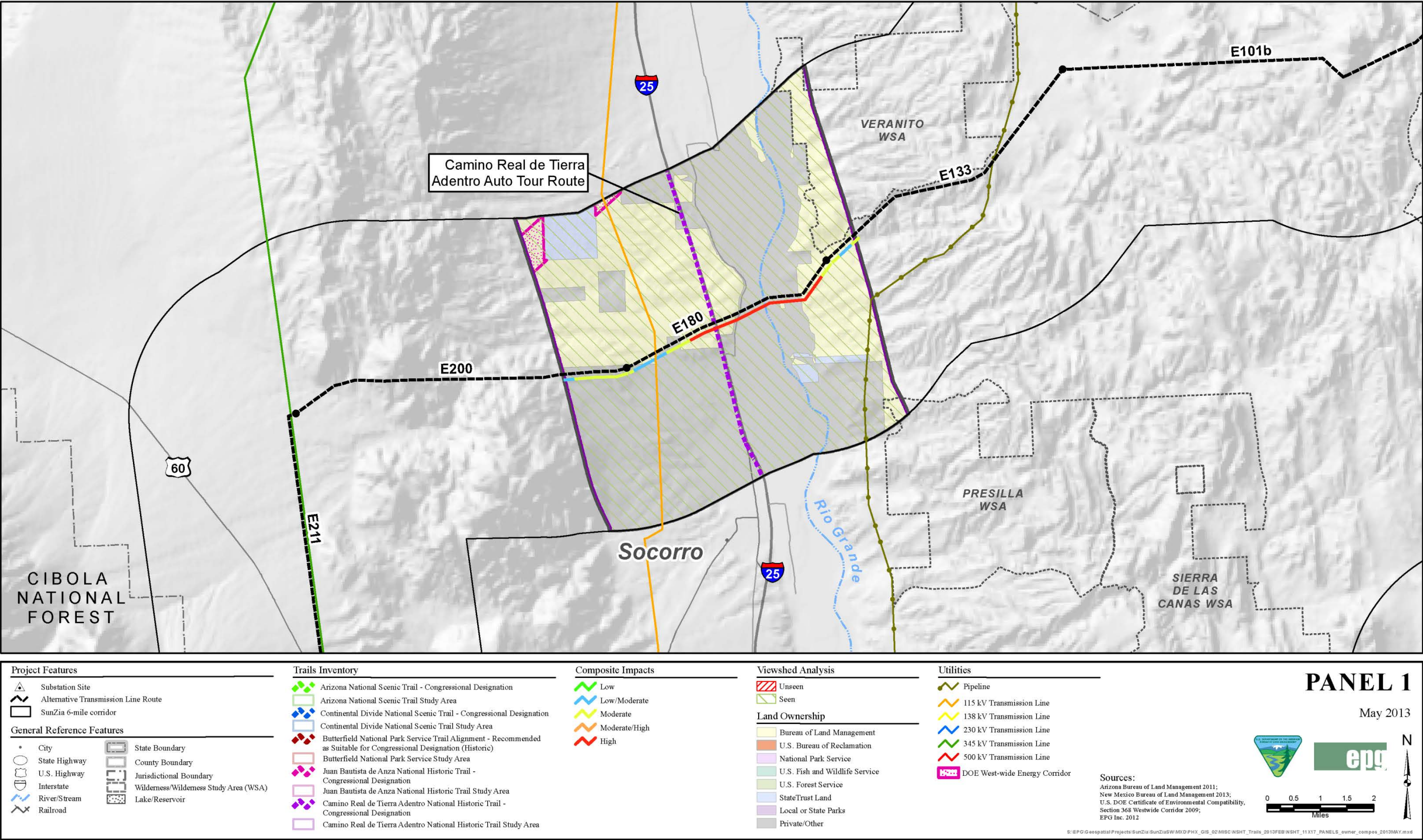


Figure L-34. Composite impact assessment results (Panel 1)

This page intentionally left blank.

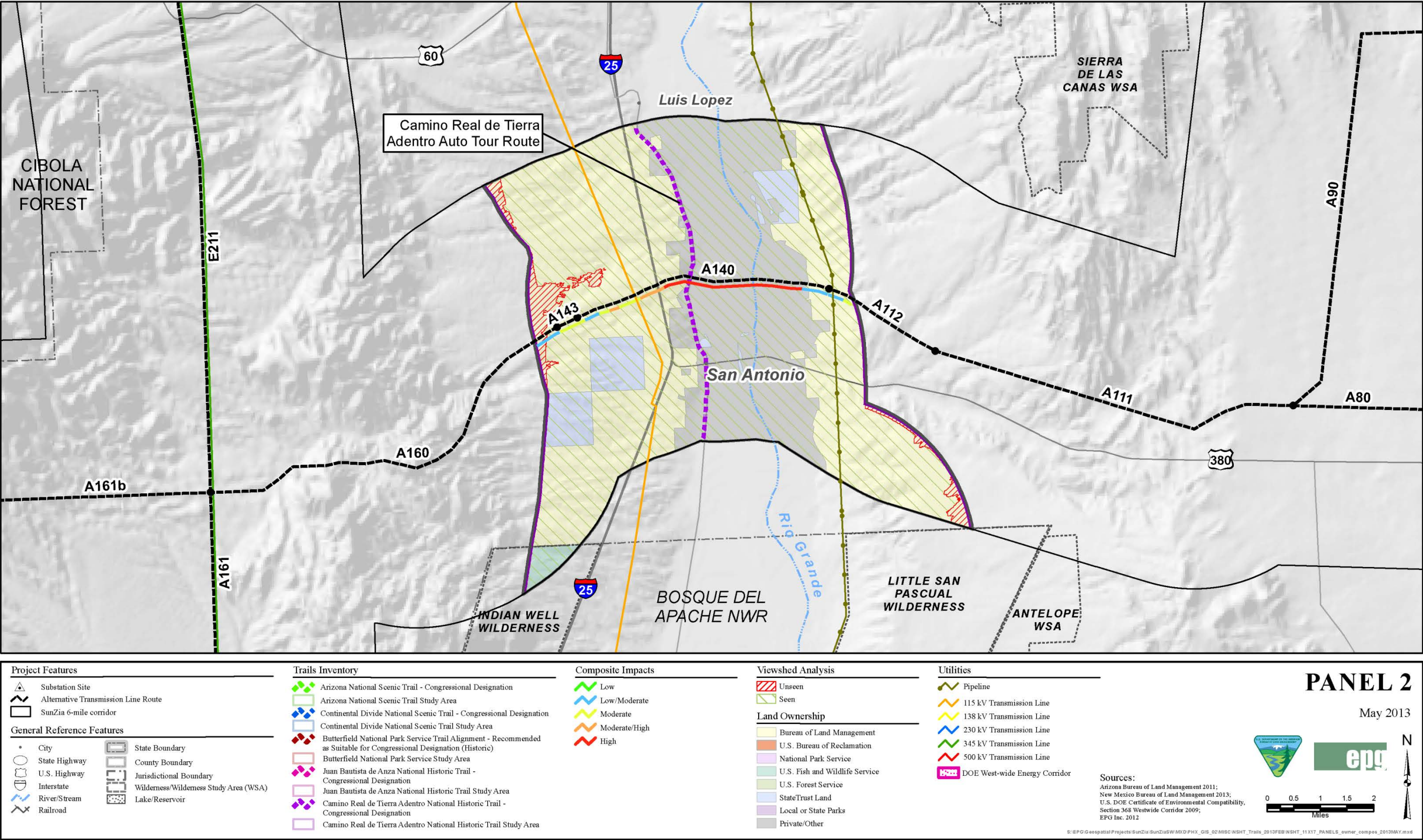


Figure L-35. Composite impact assessment results (Panel 2)

This page intentionally left blank.

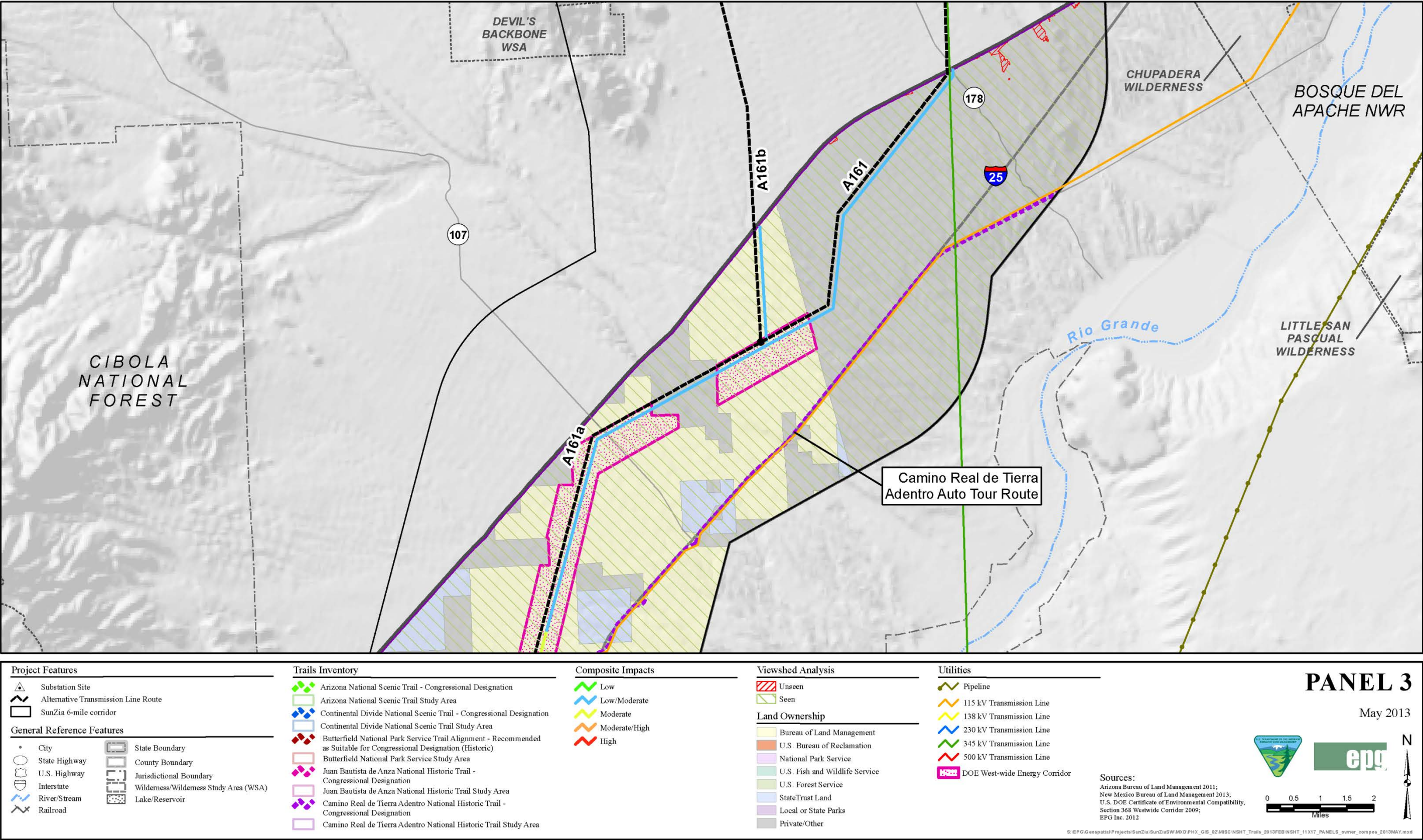


Figure L-36. Composite impact assessment results (Panel 3)

This page intentionally left blank.

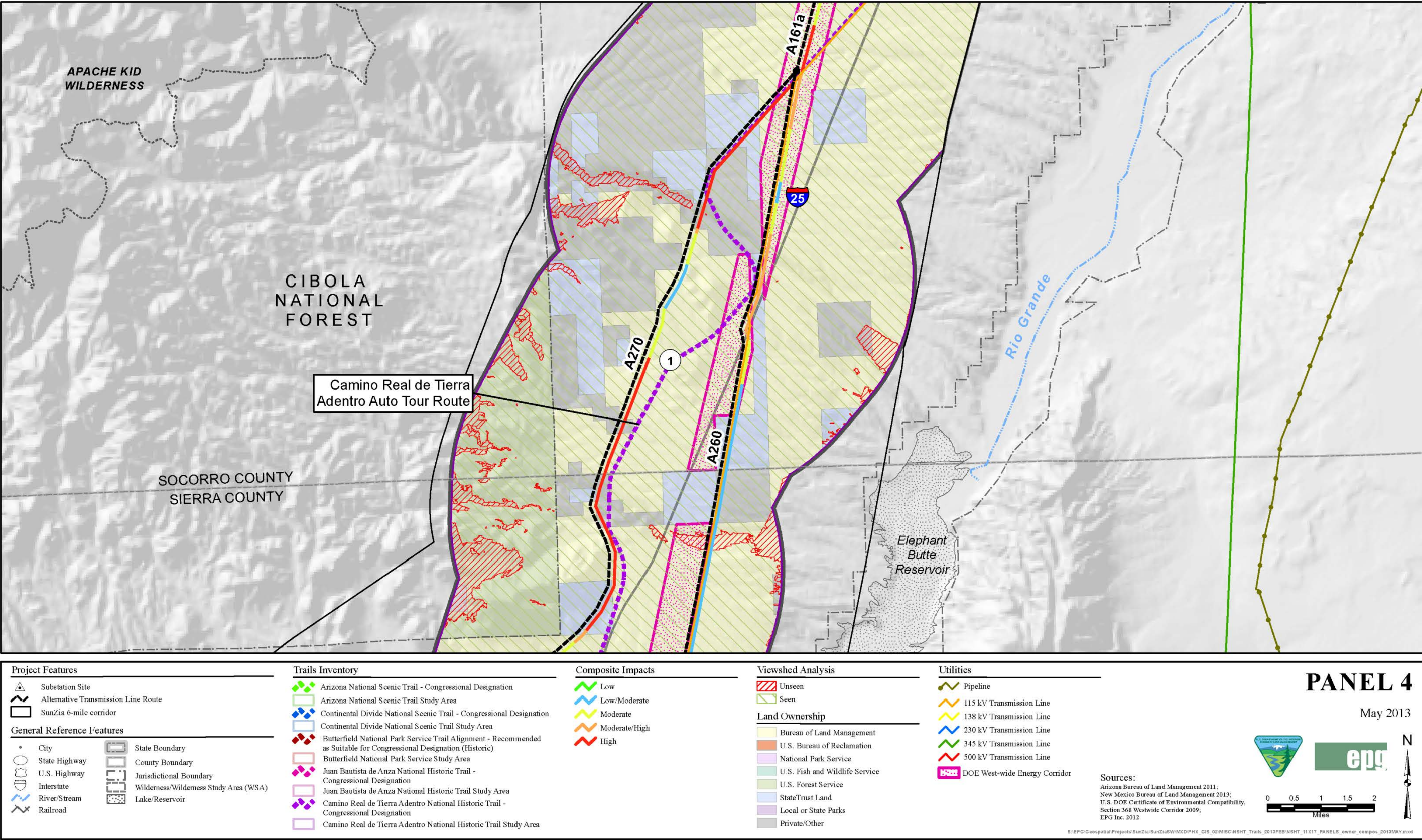


Figure L-37. Composite impact assessment results (Panel 4)

This page intentionally left blank.

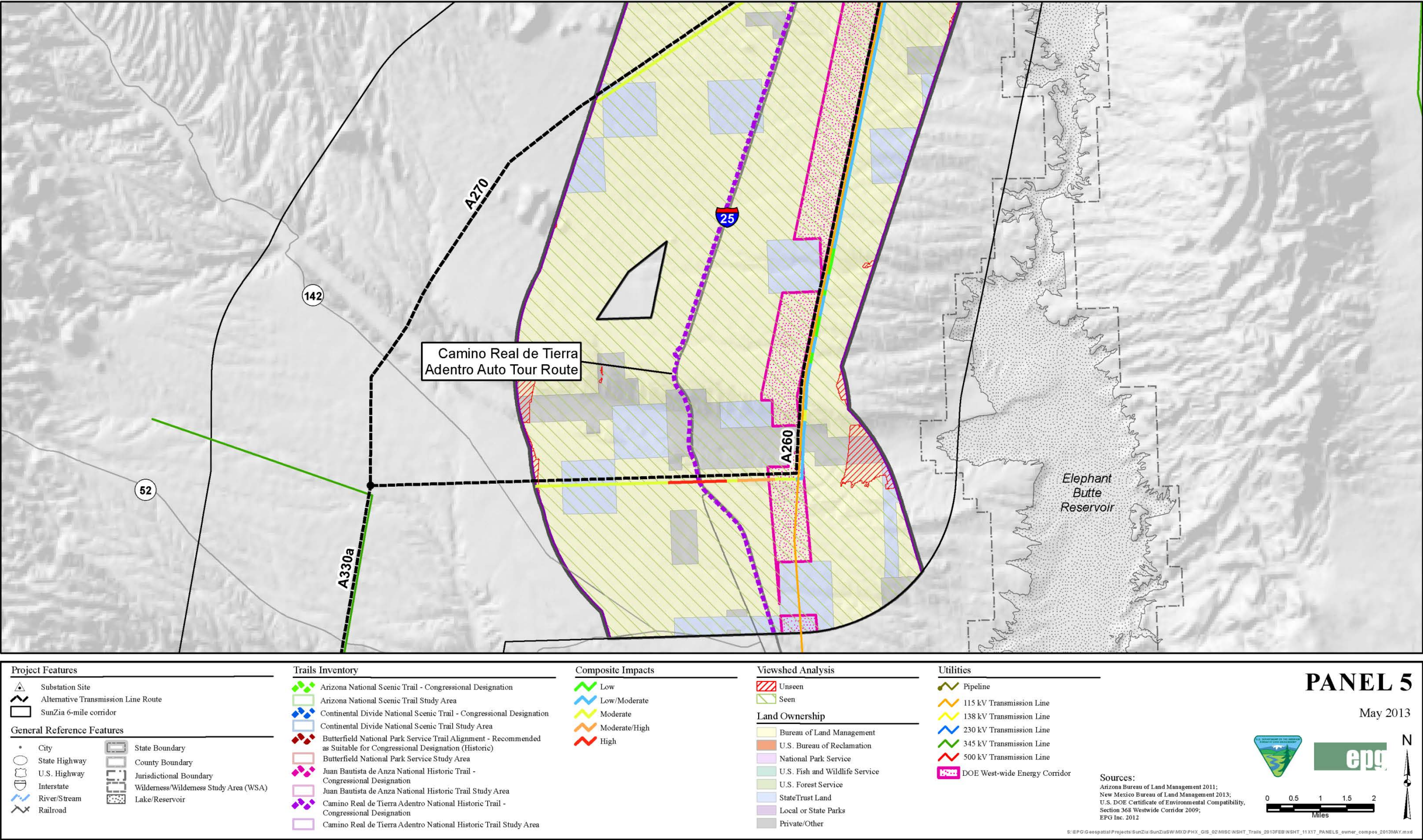


Figure L-38. Composite impact assessment results (Panel 5)

This page intentionally left blank.

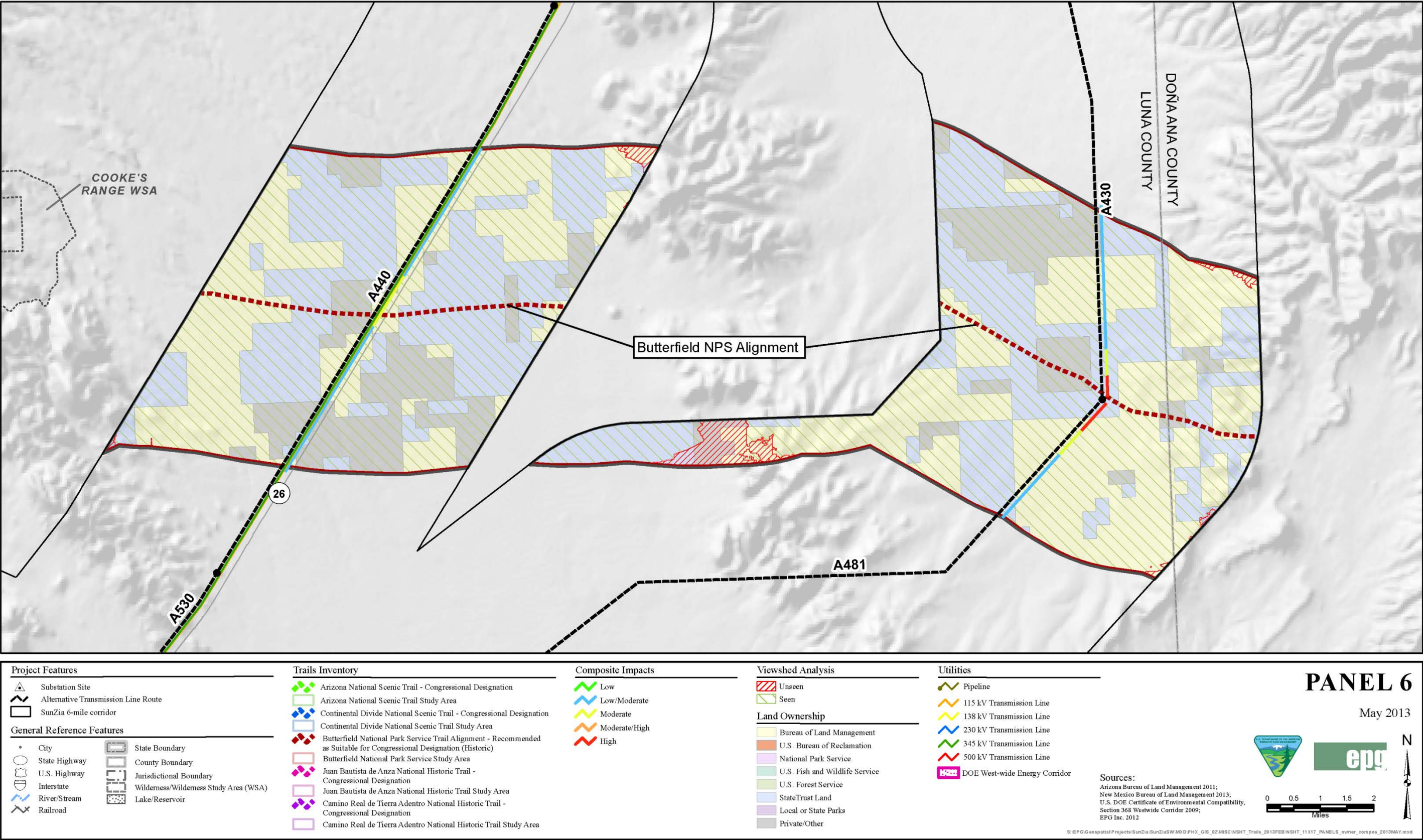


Figure L-39. Composite impact assessment results (Panel 6)

This page intentionally left blank.

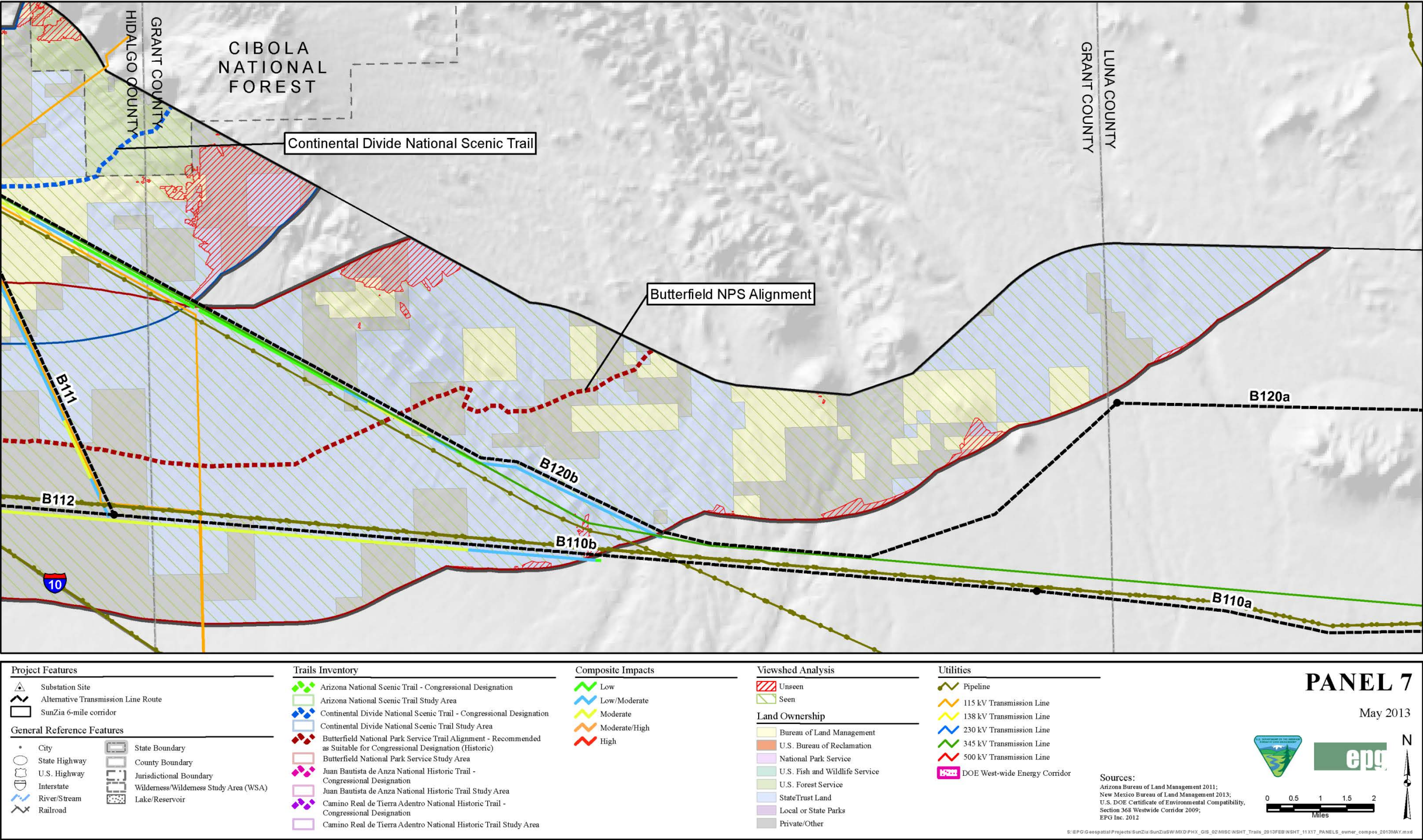


Figure L-40. Composite impact assessment results (Panel 7)

This page intentionally left blank.

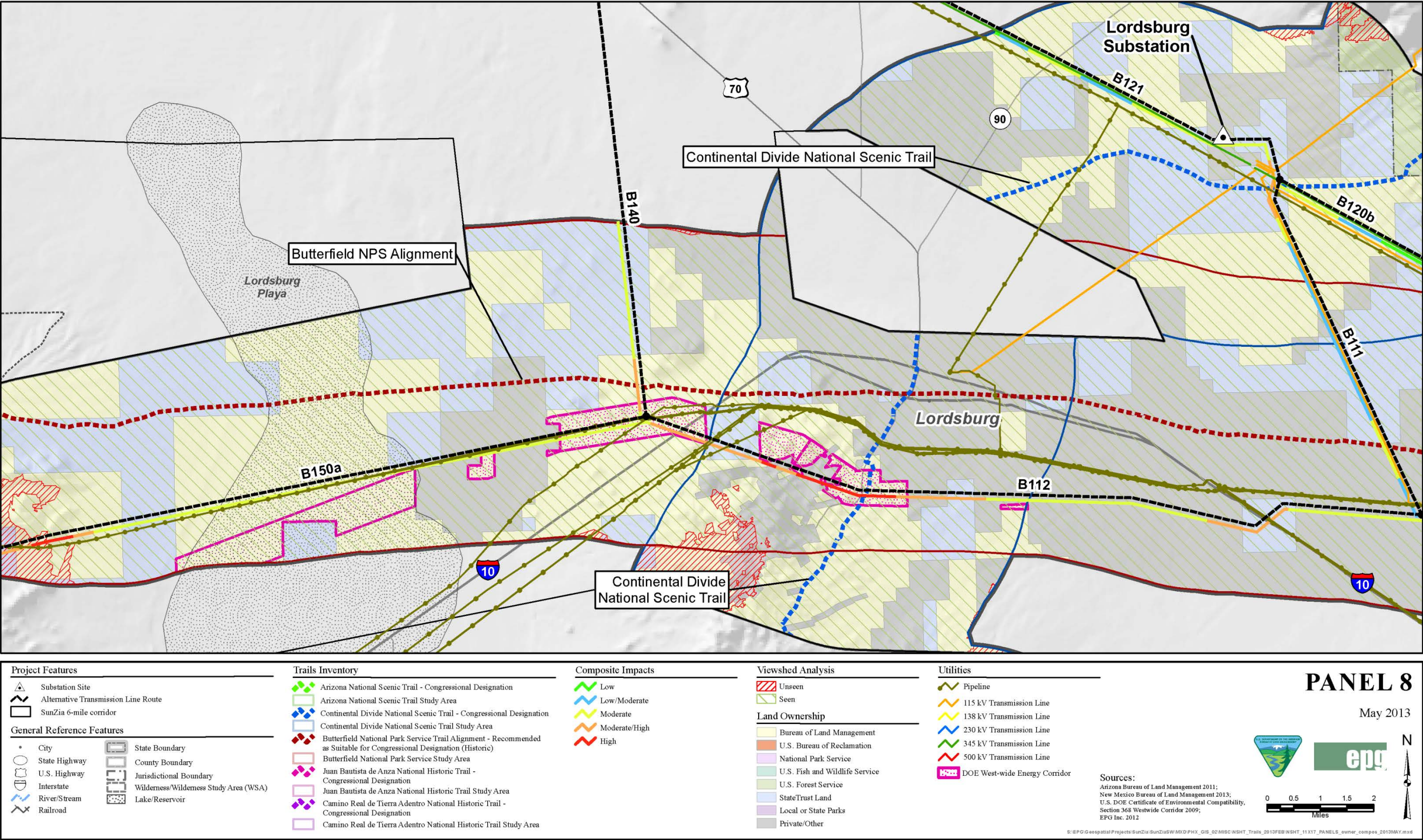


Figure L-41. Composite impact assessment results (Panel 8)

This page intentionally left blank.

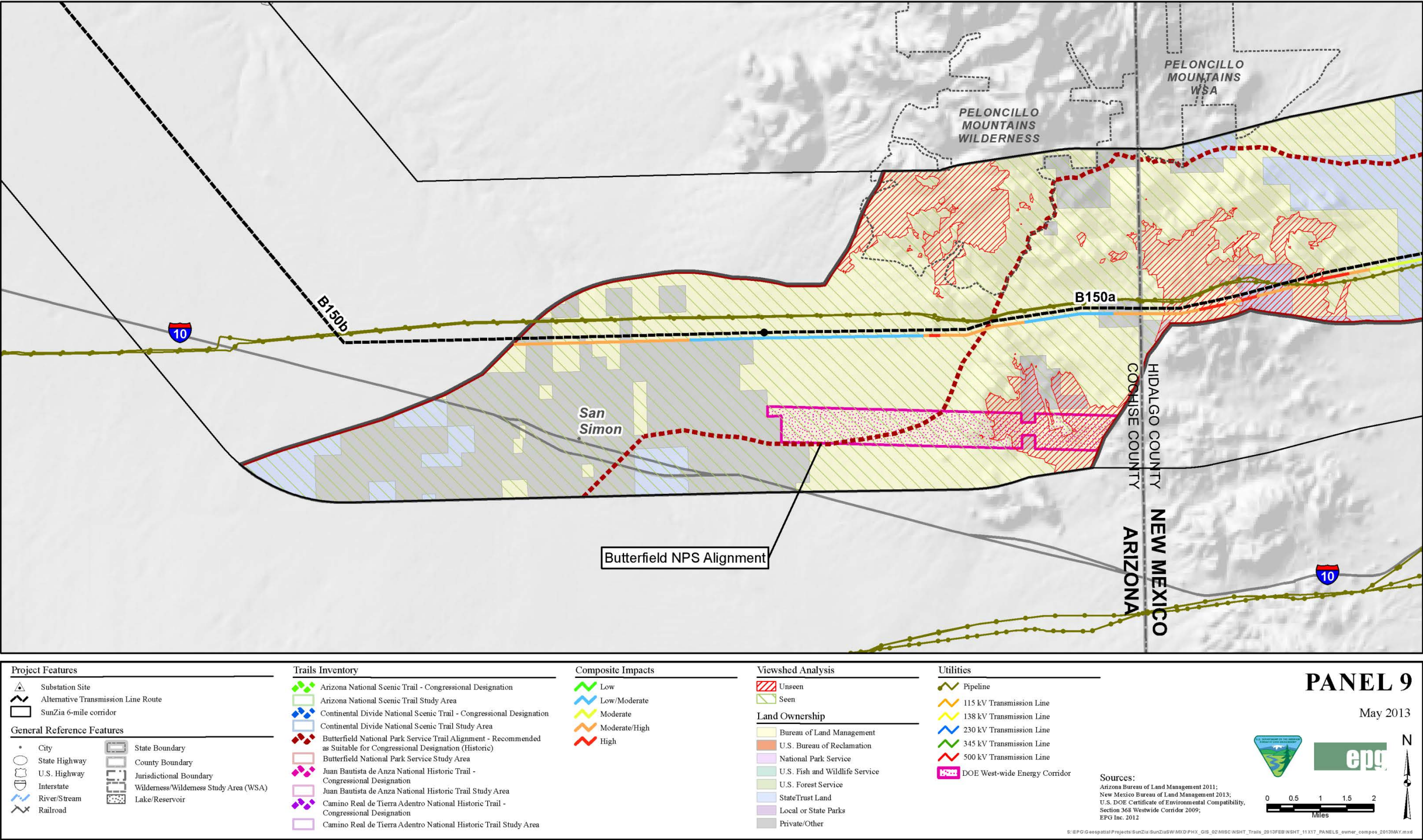


Figure L-42. Composite impact assessment results (Panel 9)

This page intentionally left blank.

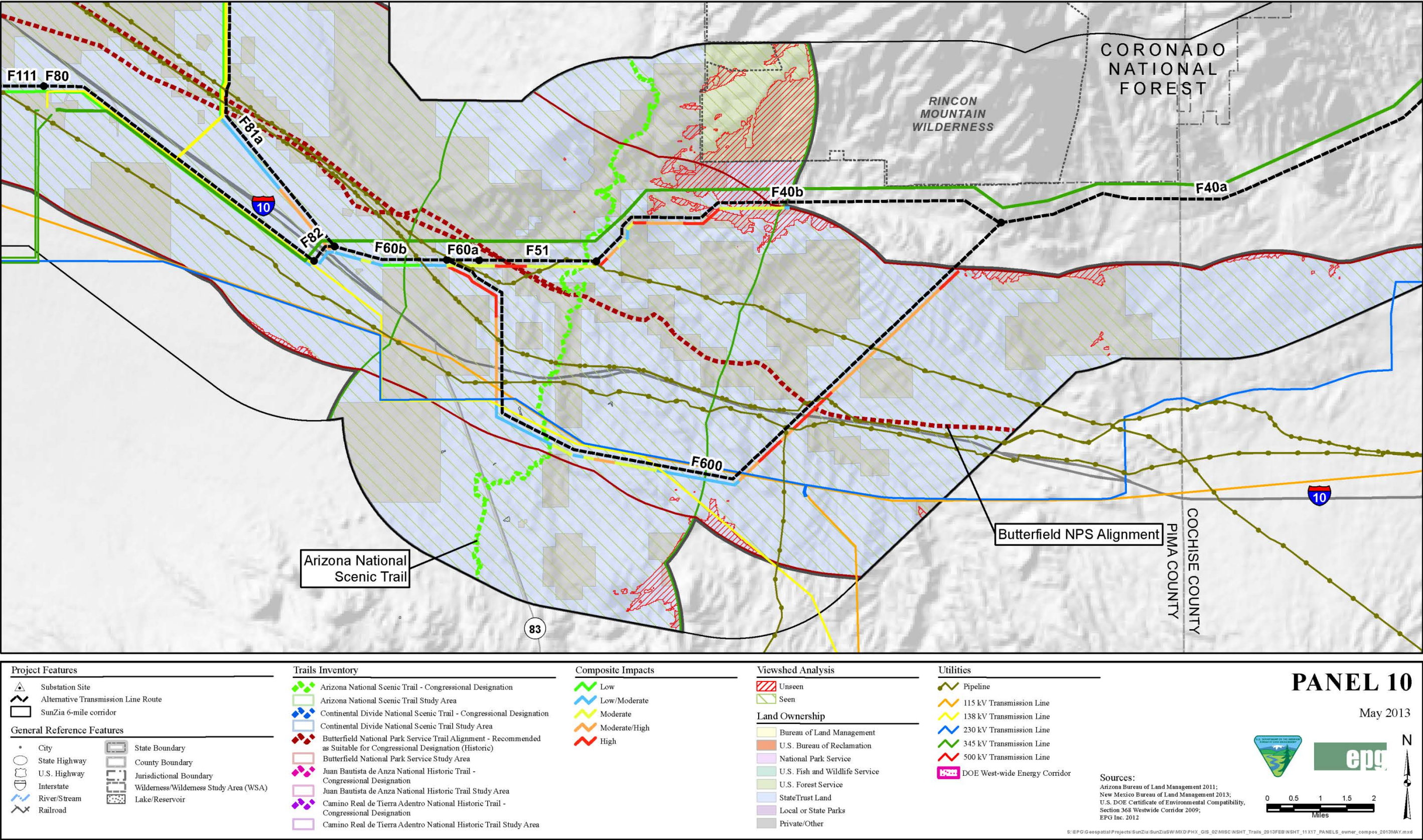


Figure L-43. Composite impact assessment results (Panel 10)

This page intentionally left blank.

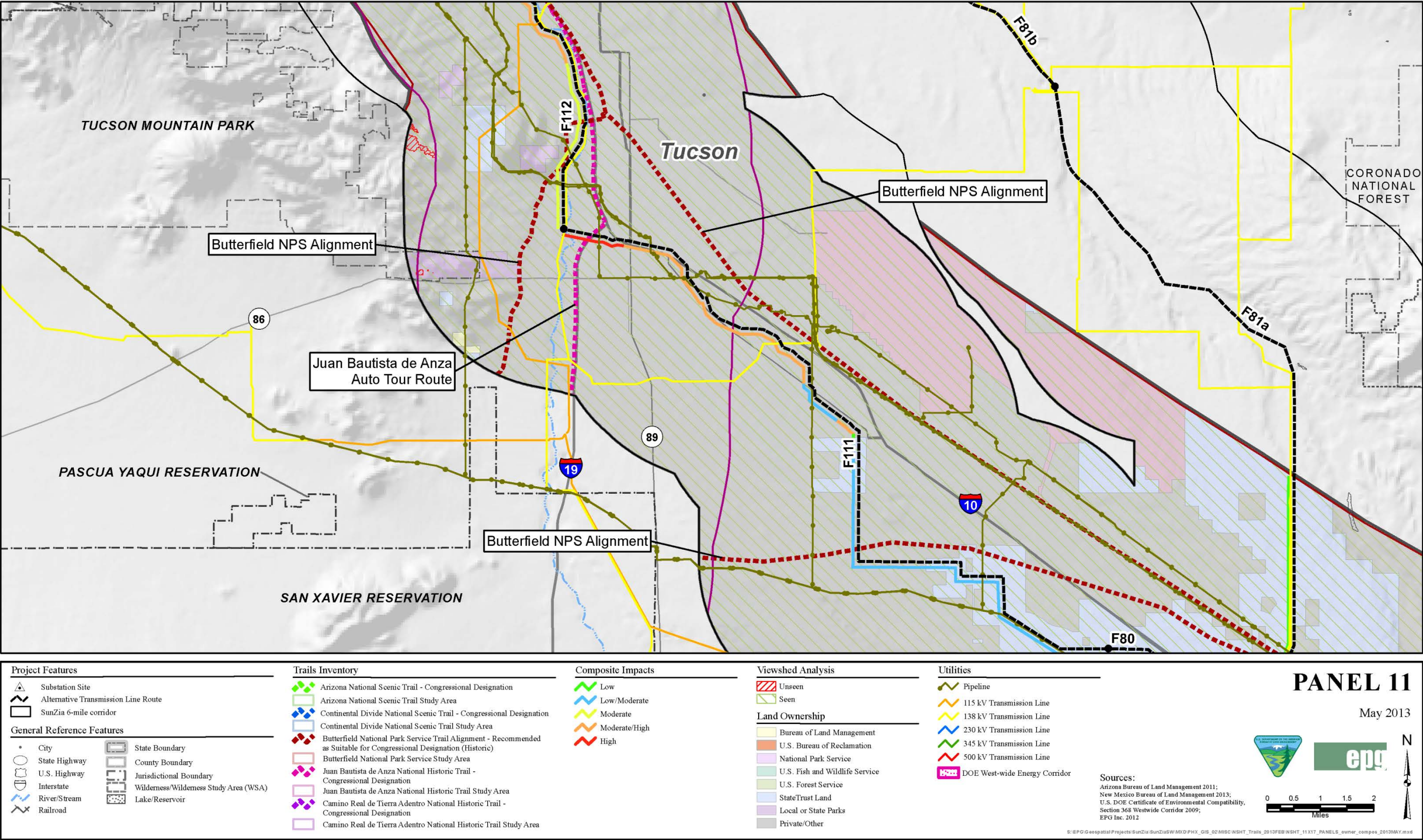


Figure L-44. Composite impact assessment results (Panel 11)

This page intentionally left blank.

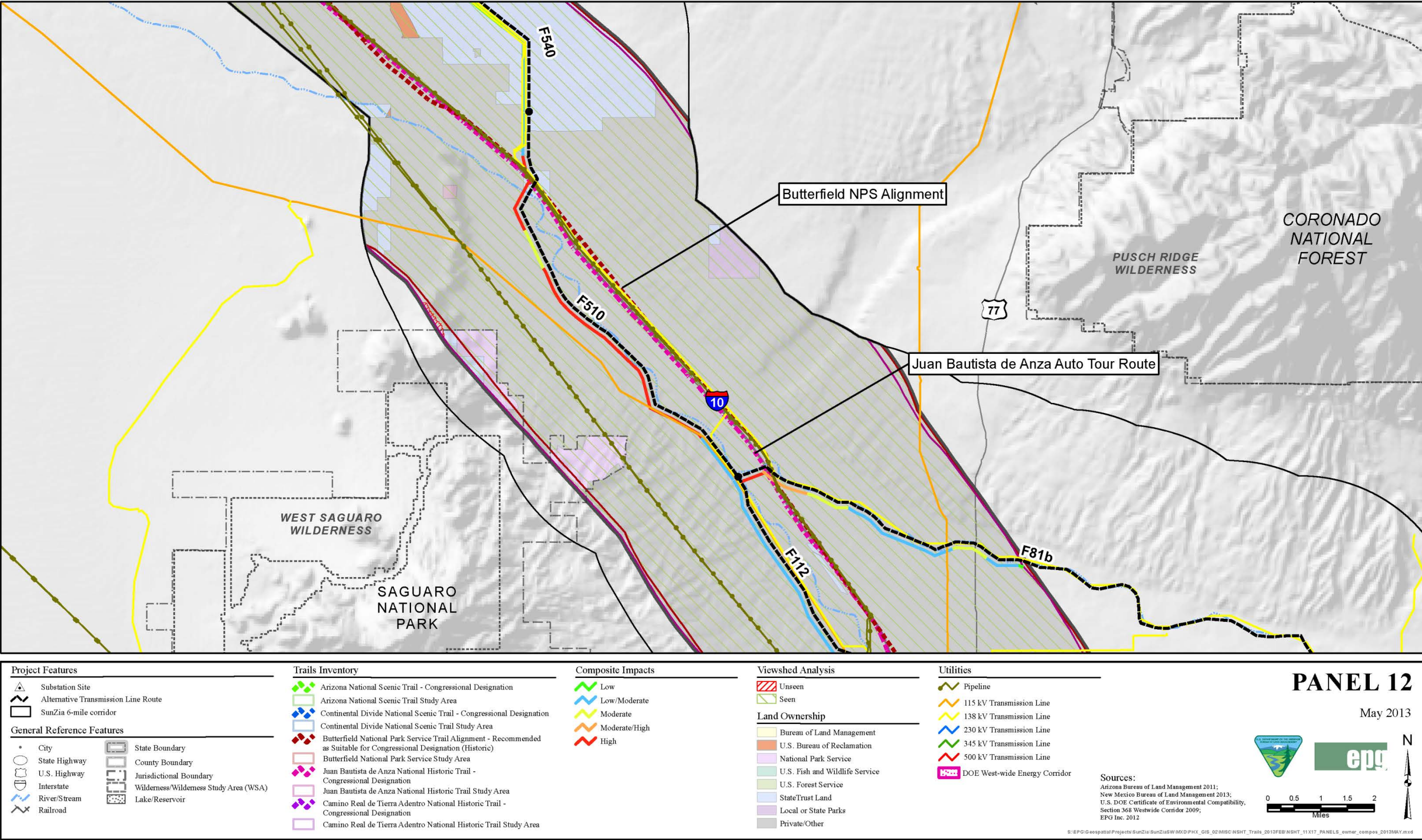


Figure L-45. Composite impact assessment results (Panel 12)

This page intentionally left blank.

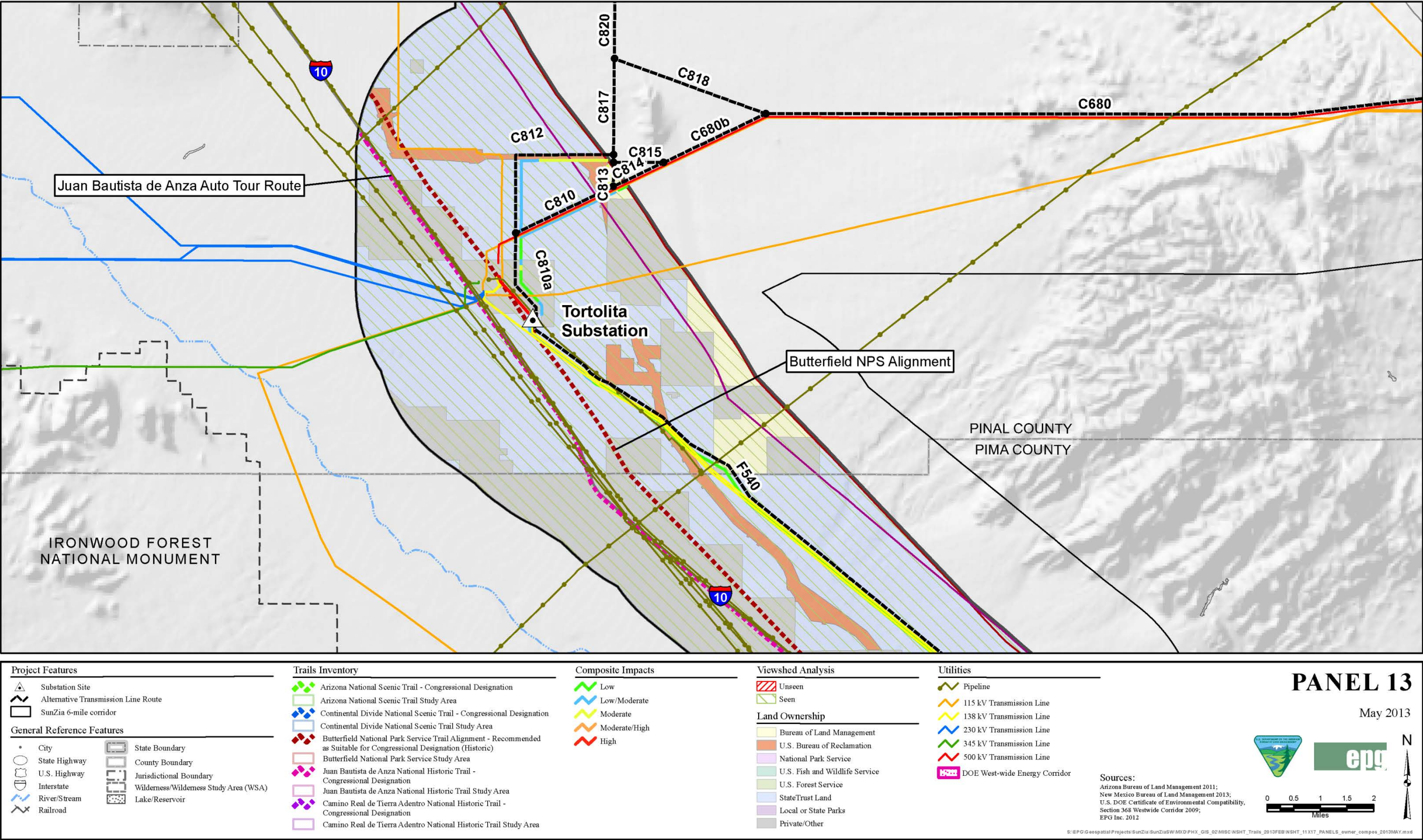


Figure L-46. Composite impact assessment results (Panel 13)

This page intentionally left blank.

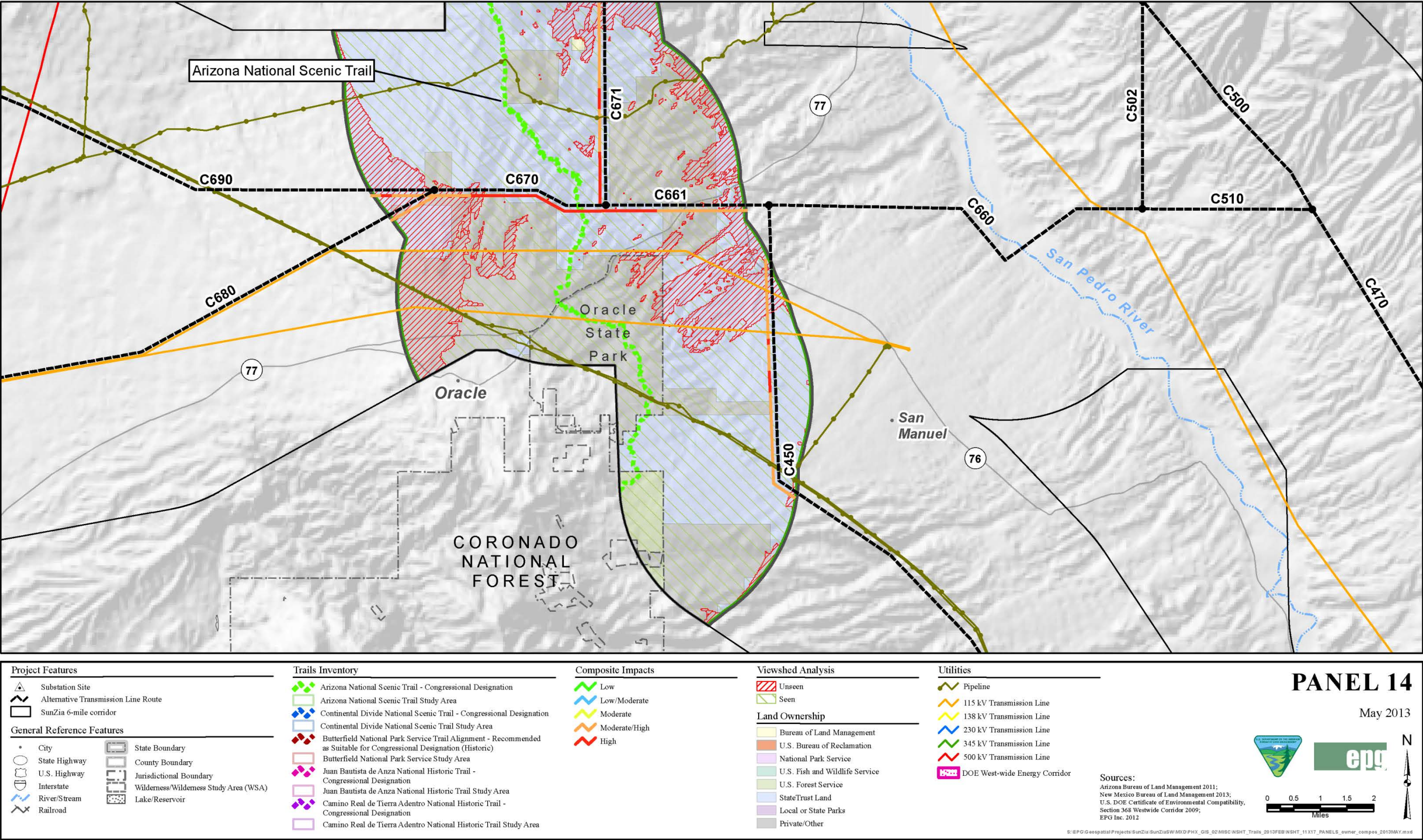


Figure L-47. Composite impact assessment results (Panel 14)

This page intentionally left blank.

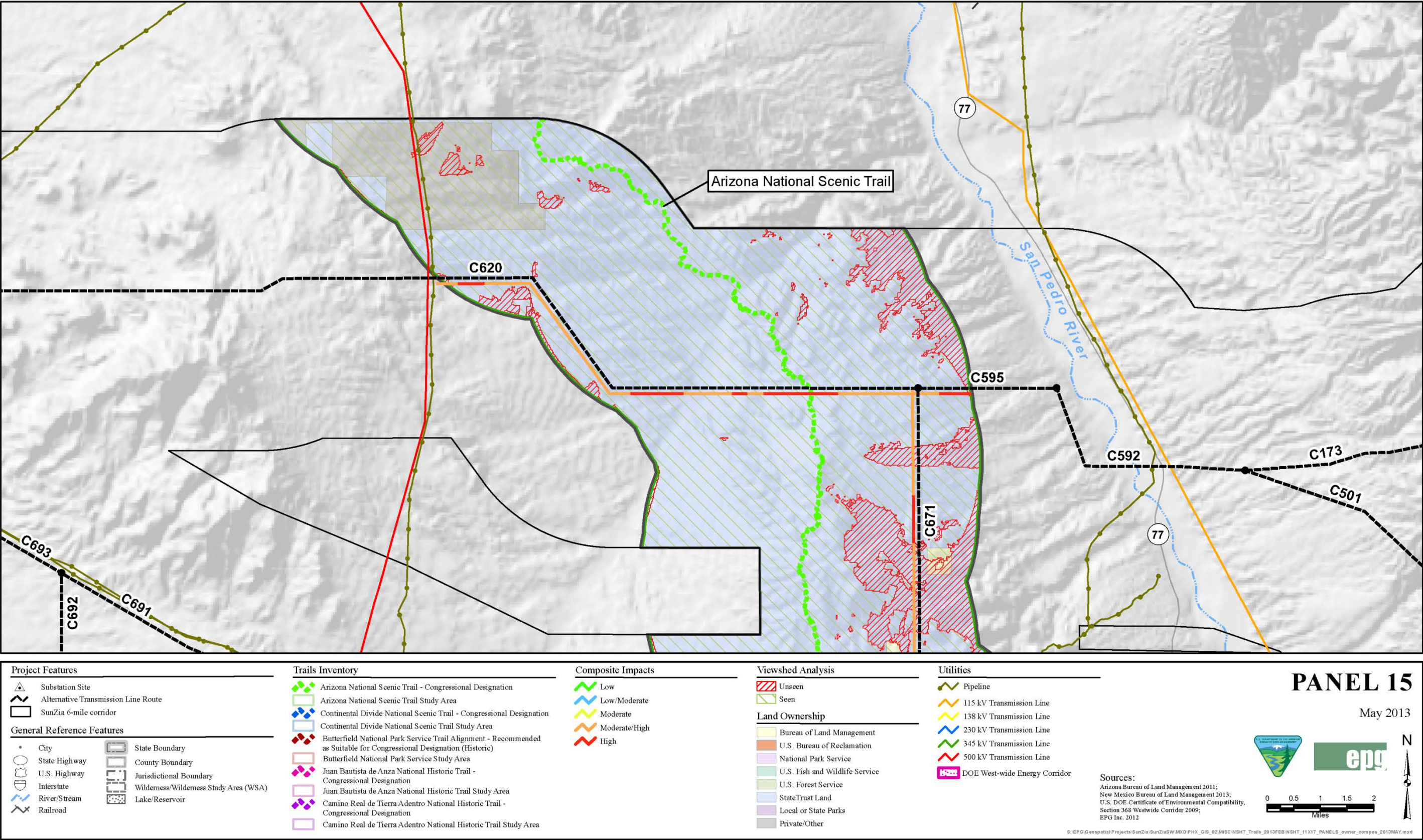


Figure L-48. Composite impact assessment results (Panel 15)

This page intentionally left blank.

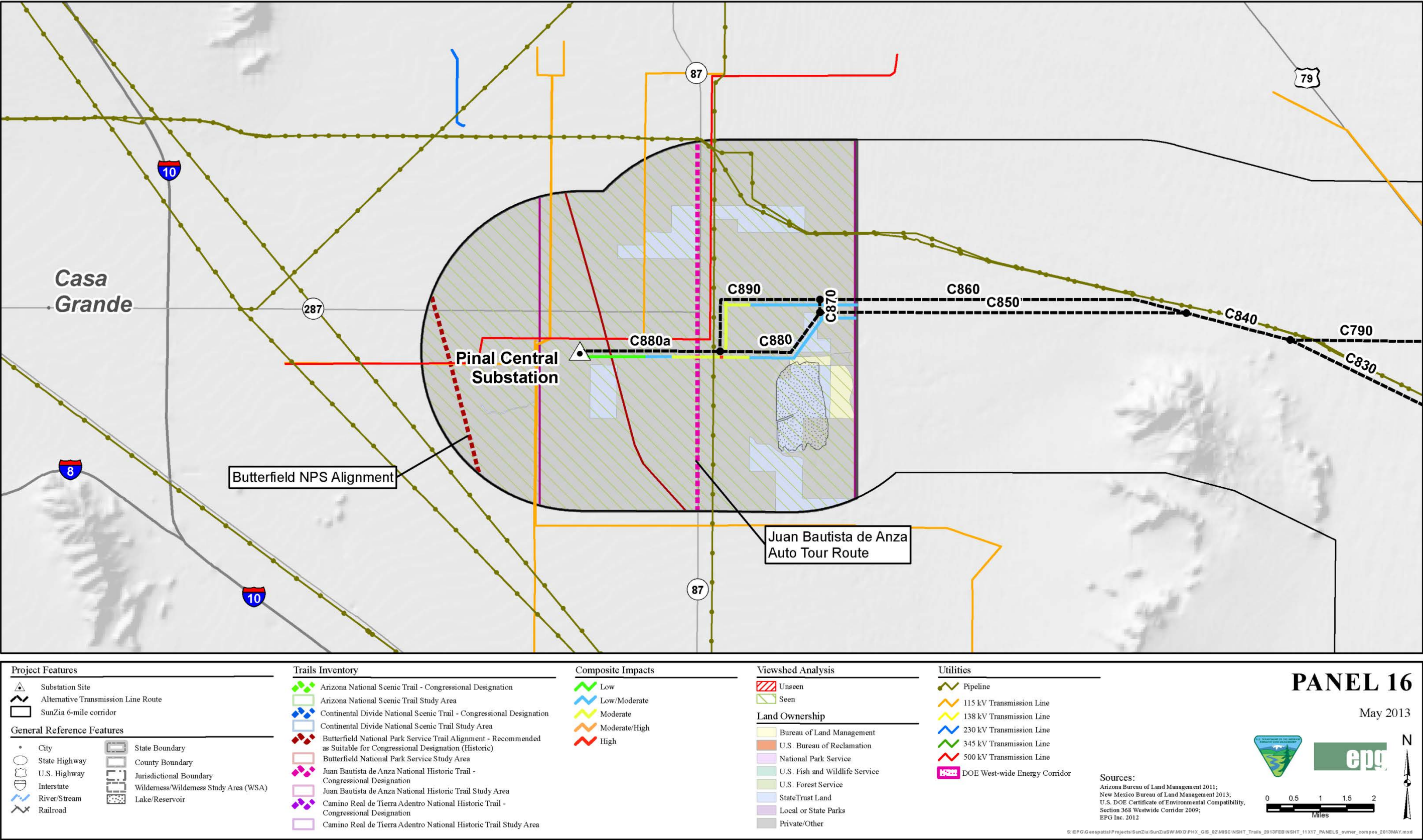


Figure L-49. Composite impact assessment results (Panel 16)

This page intentionally left blank.

APPENDIX M DRAFT PROGRAMMATIC AGREEMENT

DRAFT
Programmatic Agreement
Among
The Bureau of Land Management
The Arizona State Historic Preservation Officer
The New Mexico State Historic Preservation Officer
The Advisory Council on Historic Preservation
The United States Army Corps of Engineers
The New Mexico State Land Office
The New Mexico Department of Transportation
The Arizona State Museum
The Arizona State Land Department
The Arizona Department of Transportation
and
SunZia Transmission, LLC
Regarding the
SunZia Southwest Transmission Line Project

1. **Whereas**, SunZia Transmission, LLC, intends to construct, operate and maintain the SunZia Southwest Transmission Line Project (Undertaking) according to general parameters contained in the project Plan of Development (POD), summarized in the Undertaking Description (Attachment 1) and;
2. **Whereas**, the BLM intends to issue a right-of-way (ROW) grant for the construction, operation and maintenance of the SunZia Southwest Transmission Line Project, and the ROW grant will reference this PA; and
3. **Whereas**, this Programmatic Agreement (PA) and the Historic Properties Treatment Plan (HPTP) that will be developed pursuant to this PA will be incorporated into the POD; and
4. **Whereas**, the New Mexico State Office of the Bureau of Land Management (BLM) is a Signatory to this Agreement and has been designated to serve as the federal lead agency for the Project and in consultation with other parties has determined that the Undertaking will have an adverse effect upon properties included in or eligible for inclusion in the National Register of Historic Places (NRHP); and
5. **Whereas**, the BLM has consulted with the New Mexico State Historic Preservation Officer and the Arizona State Historic Preservation Officer (SHPO), pursuant to Section 800.6 of the regulations (36 CFR part 800) implementing Section 106 of the National Historic Preservation Act (NHPA)(16 U.S.C. 470f) and they are Signatories to this Agreement; and
6. **Whereas**, the BLM has notified the Advisory Council on Historic Preservation (ACHP) pursuant to 36 CFR § 800.6(a)(1)(i)(C) that the Undertaking will have adverse effects on properties listed on or

eligible for listing on the NRHP (8-14-12) and the ACHP has agreed to participate to resolve adverse effects and is a Signatory to this Agreement (8-27-12); and

7. **Whereas**, the BLM is responsible for government-to-government consultation with Indian tribes and pursuant to section 101(d)(6)(B) of the NHPA, 36 CFR § 800.2(c)(2)(ii), the American Indian Religious Freedom Act (42 U.S.C. 1996; AIRFA), Executive Order 13175, and section 3(c) of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001-13; NAGPRA), and has formally invited the 29 Indian tribes listed below to participate in consultations regarding the potential effects of the Undertaking on properties to which they ascribe traditional religious and cultural significance; and
8. **Whereas** the Tohono O’odham Nation, the Gila River Indian Community, the Salt River Pima-Maricopa Indian Community, the Ak-Chin Indian Community, the Hopi Tribe, the Tonto Apache Tribe, the Yavapai-Apache Nation, the Pascua Yaqui Tribe, the San Carlos Apache Tribe, the Mescalero Apache Tribe, the White Mountain Apache Tribe, the Navajo Nation, the Pueblo of Acoma, the Pueblo of Laguna, the Pueblo of Isleta, the Pueblo of Jemez, the Pueblo of Santo Domingo, the Pueblo of Sandia, the Pueblo of Taos, the Pueblo of Tesuque, the Pueblo of Zuni, the Jicarilla Apache Tribe, the Comanche Indian Tribe, the Fort Sill Apache Tribe of Oklahoma, the Kiowa Tribe of Oklahoma, the Apache Tribe of Oklahoma, the Caddo Indian Tribe, the Wichita and Affiliated Tribes, and the Ysleta del Sur Pueblo, have been consulted and have been invited to be Concurring Parties to this Agreement; and
9. **Whereas** the Pueblo of Zuni, the Hopi Tribe, the Tohono O’odham Nation, the Gila River Indian Community, the Salt River Pima-Maricopa Indian Community, the Ak-Chin Indian Community, the San Carlos Apache, the Fort Sill Apache, the Mescalero Apache, the Pueblo of Isleta, and the Pueblo of Ysleta del Sur have indicated a desire to participate in consultations for this Undertaking; and
10. **Whereas**, the Undertaking crosses lands under the jurisdiction of the New Mexico State Land Office (NMSLO) and the Arizona State Land Department (ASLD) and the BLM has consulted with these agencies about the effects of the Undertaking on historic properties and has invited them to be Invited Signatories to this Agreement; and
11. **Whereas**, the BLM has consulted with the New Mexico Department of Transportation (NMDOT) and the Arizona Department of Transportation (ADOT), who may issue ROWs to the Applicant for access to and construction of certain components of the Undertaking, and has invited them to be Invited Signatories to this Agreement; and
12. **Whereas**, the United States Army Corps of Engineers (USACE) will be responsible for issuing permits under Section 404 of the Clean Water Act for the Undertaking and the BLM has consulted with them about the effects of the Undertaking on historic properties and has invited them to be an Invited Signatory to this Agreement; and
13. **Whereas**, the ASLD and ADOT intend to use provisions of this Agreement to address the applicable requirements of the Arizona State Historic Preservation Act (A.R.S. § 41-861 et. seq.) and the

Arizona Antiquities Act (AAA) (A.R.S. § 41-841 et. seq.) on lands owned or controlled by the State of Arizona; and the NMSLO and NMDOT intend to use the provisions of this Agreement to address the applicable requirements of the Cultural Properties Act (§ 18-6-1 through § 18-6-17 NMSA 1978), the Cultural Properties Protection Act (§ 18-6A-1 through § 18-6A-6 NMSA 1978) and the Prehistoric and Historic Sites Preservation Act (§ 18-8-1 through § 18-8-7 NMSA 1978); and

- 14. Whereas**, the Arizona State Museum (ASM) has been invited to participate pursuant to 36 CFR § 800.6 (c)(2)(iii), as it has defined authority and responsibilities under A.R.S. § 41-841 et. seq. that apply to that portion of the undertaking on state lands in Arizona (state, county, city and municipal lands); and defined authority and responsibilities under A.R.S. § 41-865 that apply to that portion of the undertaking on private lands and BLM has invited them to be an Invited Signatory to this Agreement; and
- 15. Whereas**, SunZia Transmission, LLC (Applicant), has participated in consultations and the BLM has invited them to be an Invited Signatory to this Agreement; and
- 16. Whereas**, El Camino Real de Tierra Adentro National Historic Trail is co-administered by the BLM and the National Park Service, National Trails Intermountain Region Office (NPS-NTIR), and the BLM has determined that the Undertaking will likely affect this Trail and has invited the NPS – NTIR to be a Concurring Party to this Agreement; and
- 17. Whereas**, the BLM has provided the public opportunities to comment on the Undertaking and participate in the National Environmental Policy Act (NEPA) process through a Notice of Intent to Prepare an Environmental Impact Statement (EIS) published in the Federal Register on May 29, 2009 for the development of the EIS; held nine public scoping meetings in June and July 2009; held three additional scoping meetings in October 2009; held two additional scoping meetings in April 2010; published the Draft EIS in May 2012 and held ten public meetings in June and July of 2012. Public meeting materials included information about the NHPA and the Section 106 process and BLM considered comments received through the NEPA and NHPA processes concerning cultural resources in the development of this Agreement; and
- 18. Whereas**, the following organizations and agencies have participated in consultations as Consulting Parties in accordance with 36 CFR § 800.2(c)(5) and 800.3(f)(1) and (3): the Arizona Archaeological Council, the New Mexico Archaeological Council, the National Trust for Historic Preservation, Archaeology Southwest, the Camino Real Trail Association (CARTA), the Cascabel Working Group, the NPS, Salinas Pueblo Missions National Monument, White Sands Missile Range, the Alliance for Regional Military Support (ARMS) and Pima County, Arizona, and BLM has invited them to be Concurring Parties to this Agreement;

Now, Therefore, the parties to this document agree that the SunZia Transmission Line Project shall be completed in accordance with the stipulations established in this Agreement in order to take into account the effects of the Undertaking on historic properties.

UNDERTAKING DESCRIPTION

The Undertaking encompasses the construction phase of the proposed transmission line project that takes place after the BLM ROW grant is issued and includes and associated project facilities as well as reclamation of areas used during construction but not necessary for operation and maintenance of the facilities. The Undertaking may include surveys, geotechnical testing, engineering, mitigation planning and design, or other activities initiated prior to construction of project facilities. The potential effects to historic properties will be the most extensive and substantial during the construction phase. The undertaking also encompasses those activities necessary to operate and maintain the transmission line over the life of the project. Operation and maintenance activities are approved in the ROW grant and confined to the ROW. Changes to approved operations and maintenance activities, including new actions outside of the ROW, require BLM approval and may necessitate a separate Section 106 review. This PA considers the process necessary to comply with Section 106 obligations for construction and reclamation as well as operation and maintenance of the proposed transmission lines and associated facilities.

Decommissioning will take place in the future and will be considered a separate undertaking when it occurs.

See Attachment 1 for a more detailed description of the Undertaking and **Attachment 2** for a map of the Undertaking

DEFINITIONS USED IN THIS AGREEMENT

See Attachment 3

STIPULATIONS

The BLM shall ensure that the Project is carried out in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties:

I. Identification of Historic Properties

A. The Areas of Potential Effect (APE) (see Attachments 2 and 3) are defined as:

1. **Direct effects:** The APE for direct effects during construction and reclamation will include all areas likely to be affected by construction and reclamation activities. This APE will be the 400- to 1000-foot-wide permitted ROW corridor for two parallel 500 kV transmission lines and access roads (within corridor) plus 100 feet on either side of the corridor. The 1200 foot width will allow for adjustments in transmission line or access road placement to avoid when possible, natural, cultural or modern features such as outcrops, historic properties, petroglyph sites and structures.

- a. Proposed new access routes and existing roads requiring improvement outside the transmission line ROW will have a 150-foot-wide APE (75 feet from centerline).
 - b. The APE for staging areas, borrow areas, substations, and other transmission infrastructure will include the footprint of the facility and a buffer of 200 feet around the footprint of the proposed activity/facility.
 - c. The APE for pulling/tensioning sites that fall outside the ROW will be the footprint of the site plus a 250-foot radius around these points.
 - d. Direct effects from operation and maintenance activities will be confined to the ROW.
2. **Indirect effects:** The APE for indirect effects shall be areas visible and within five miles of any project component (including conductors and access roads) or to the visual horizon, whichever is closer, or where consultation identifies a need to expand this APE in certain locations.
- a. A Geographic Information System (GIS) view shed analysis will be used to identify areas in the indirect effects APE from which the Undertaking may be visible.
 - b. The indirect effects APE may extend beyond the five mile convention to encompass properties that have traditional religious and cultural importance, including traditional cultural properties (TCP), or other geographically extensive historic properties such as trails, when effects have been determined to extend beyond this distance.
3. **Cumulative effects:** The APE for cumulative effects shall be the same as that for direct and indirect effects.
- B. The Applicant shall complete a cultural resources inventory to identify historic properties that could be affected by the Undertaking. This inventory will include:
- 1. A Class I, Existing Data Inventory of all previously recorded cultural resources within ¼ mile of the APEs described in I.A.1., and the entire APE described in I.A.2. In performing the Class I Inventory, historical maps including 15' topographic maps, General Land Office maps and survey notes, and other archival sources will be reviewed for properties that are over 50 years old that may be affected by the Undertaking.
 - 2. A Class III, Intensive Field Inventory of the direct effects APE as defined in Stipulation I.A.1., above. The Class III Inventory will be conducted with sensitivity for non-archaeological locations or other features identified as important through tribal consultation or ethnographic studies.
 - a. For the direct effects APE as defined in I.A.1., all historic linear features such as canals, roads, trails, and railroads will be identified and recorded where they intersect

the APE and will be fully recorded within the APE. For the indirect effects APE as defined in I.A.2., all historic linear features such as canals, roads, trails, and railroads will be identified where they intersect the APE for direct effects.

- b. All previously recorded cultural resources within the direct effects APE will be re-visited with the associated records updated and revised if appropriate including NRHP eligibility recommendations and determinations. Previously recorded cultural resources and newly recorded cultural resources whose boundaries lie partially within the APE will, to the extent practical, be fully recorded, regardless of surface ownership.
 - c. Previously recorded and newly recorded cultural resources will be referenced by permanent site numbers, Universal Transverse Mercator (UTM) coordinates and by Milepost within NMDOT and ADOT rights-of-ways.
 - d. Cultural-visual sensitivity assessments will be conducted for historic properties within the direct and indirect effects APEs that could be considered visually sensitive and potentially affected by the Undertaking that meet the following criteria:
 - 1) View shed analysis indicates that the Undertaking would be visible to the historic property;
 - 2) The historic property is eligible for the NRHP under criterion “a, b, or c”. Under special circumstances, historic properties eligible under criterion d only may be included.
- C. The Applicant shall prepare a comprehensive Inventory Report incorporating findings from the existing Class I/II Data Inventory and the Class III, Intensive Field Inventory for each state. This comprehensive Inventory shall include NRHP eligibility recommendations and assessments of direct, indirect and cumulative effects within the APE of the Undertaking as described in I.A.1 above.
- D. The Applicant shall submit the draft Inventory Reports for each state to the BLM. The BLM will provide the reports to the appropriate land managers, the ASM and concerned tribes within each state for review, concurrent with BLM review. Written comments will be provided to the BLM within 30 calendar days regarding the adequacy of the identification effort, the NRHP eligibility of the cultural properties identified, the effects of the Undertaking on the cultural properties identified, and whether there are any properties of traditional cultural or religious importance to tribes and ethnic groups, that were not identified in the inventory and that may be affected by the Undertaking. The BLM shall ensure that comments received within 30 calendar days are considered in development of the revised Inventory Reports. The BLM will submit the revised inventory reports to the appropriate SHPO, tribes and Consulting Parties for a 30 calendar day review and will request SHPO concurrence on determinations of eligibility and effect.

- E. As part of its identification efforts, the BLM has consulted with Indian tribes whose aboriginal territories included portions of the Undertaking area or who have previously expressed interest in undertakings within the APE. The BLM shall continue to consult with Indian tribes regarding properties of traditional religious and cultural importance to them that might be affected by the Undertaking and shall provide review and comment opportunities for draft and final versions of the Inventory Report. The consultation process will remain open for any tribe that expresses a desire to participate.

II. Determinations of National Register Eligibility

- A. When making determinations of NRHP eligibility, the BLM will consider historic sites, districts, buildings, structures and objects that are significant and meet the integrity criteria. For properties that have traditional cultural values, the BLM shall take into consideration values expressed by the consulted tribes or other ethnic groups. The BLM shall make NRHP eligibility determinations, and provide copies to appropriate Consulting Parties to provide comment, taking into consideration all comments received from the Consulting Parties. If the SHPO or the land managing agency disagrees with the BLM's determinations of eligibility, the BLM shall consult with the SHPO and the land managing agency to resolve the objection. If a resolution cannot be agreed upon, the BLM shall forward the required documentation to the Keeper of the National Register for final determinations. The BLM shall ensure that the Applicant prepares a revised Inventory Report incorporating BLM's eligibility determinations, or the Keeper's determination, if requested.
- B. Any cultural resources for which eligibility cannot be determined during the inventory phase of the Undertaking shall be identified in the Historic Properties Treatment Plan (HPTP). Additional studies such as testing, research and oral histories will be completed for all such resources that will be affected by the Undertaking to enable the BLM, the land manager, and the SHPO to make an eligibility determination. The eligibility determinations for such resources will be submitted to the respective SHPO(s) and land manager(s) with a summary report describing the results of the additional studies and a request for concurrence on the determination of eligibility. The SHPO will review these determinations of eligibility and respond to the BLM within 30 calendar days. If the SHPO does not respond to the BLM within 30 calendar days, the BLM will assume concurrence with the determination(s) of NRHP eligibility.

III. Avoiding and Minimizing the Adverse Effect of the Undertaking on Historic Properties

- A. The BLM shall, if possible, avoid adverse effects to all types of historic properties, with input from Consulting Parties.
 - 1. Avoidance measures for cultural resources may include (but are not limited to) realignment of the transmission line, fencing of sites during construction, monitoring of construction near site areas, or placing towers, maintenance roads and ancillary facilities outside of site boundaries.

2. If appropriate, the BLM shall develop avoidance measures for properties of traditional religious and cultural importance in consultation with the SHPO and affected tribes or Native American groups or other ethnic groups who ascribe traditional religious and cultural importance to the properties.
 3. Where appropriate, the BLM shall identify measures to avoid adverse effects from operation and maintenance activities to those historic properties remaining within the ROW, and shall incorporate these measures in the HPTP in accordance with Stipulation IV.A.1.
- B. Where avoidance is not possible, the BLM shall minimize or mitigate adverse effects to historic properties if possible, with input from Consulting Parties.
 - C. If any Indian tribes or other Native American groups have expressed concerns about effects on properties to which they ascribe traditional religious and cultural importance, BLM shall consult with them and the appropriate SHPO about possible measures to resolve the adverse effects and ensure that those measures are properly considered in the development of the HPTP.
 - D. In New Mexico, if the adverse effect is to a property listed in the State Register of Cultural Properties or NRHP, the Applicant must demonstrate that there is no prudent or feasible alternative to the proposed Undertaking consistent with the requirements of 4.10.12.11 NMAC. The Applicant's analysis must be submitted to the New Mexico SHPO for concurrence.

IV. Resolution of Adverse Effects: Development of the HPTP

- A. The BLM shall ensure that the Applicant prepares a HPTP for each state that will address the effects of the proposed undertaking on historic properties during the Undertaking , including TCPs as discussed in *National Register Bulletin* No. 38. The HPTP shall address potential effects from construction and reclamation as well as from operation and maintenance of the proposed transmission lines and associated facilities. The HPTP will be incorporated into the POD as an appendix and will:
 1. Identify the nature of the effects to historic properties and describe the strategies proposed to avoid, minimize, or mitigate those effects.
 2. Identify cultural resources that will be affected by the Undertaking for which NRHP eligibility determinations could not be made, and will specify the strategy for determining eligibility. It will further specify the strategy that will be used in the event that these cultural resources are determined to be eligible as a result of the testing/study phase. Stipulation II.C will be followed for determining eligibility.

3. Be consistent with the Secretary of the Interior's Standards and Guidelines (48 CFR 44716-44742); the ACHP's handbook, *Section 106 Archaeology Guidance* (<http://www.achp.gov/archguide>); the rules implementing the AAA and 36 CFR§ 800.13, *Post-Review Discoveries*, and in so doing will incorporate provisions for monitoring and inadvertent discoveries.
4. At a minimum, the HPTP will specify and include:
 - a. The historic properties to be affected by the Undertaking and the nature of those effects.
 - b. The historic properties to be avoided and applicable avoidance measures, pursuant to Stipulation III.A.
 - c. The historic properties where harm will be minimized and applicable measures to minimize harm.
 - d. The properties at which adverse effects will be mitigated through scientific data recovery or other means.
 - e. For archaeological resources, research questions and goals that are applicable to the Undertaking area and which can be addressed through data recovery and archival studies, along with an explanation of their relevance and importance. These research questions and goals will incorporate the concept of historic contexts as defined in National Register Bulletin 16.
 - f. Fieldwork and analytical methods and strategies applicable to the Undertaking area, along with an explanation of their relevance to the research questions when dealing with archaeological resources. Treatment methods will be developed for each class of property identified in the Inventory Report and may include excavation, scientific studies outside of the ROW, archival research, off-site interpretation, remote sensing, ethnographic studies, and oral history, as appropriate.
 - g. The level of effort to be expended on the treatment of each property. For archaeological resources this will include methods of sampling, i.e., sample size, and rationale for specific sample unit selection.
 - h. Data management and dissemination methodologies, including a proposed schedule of reports.
 - i. A Monitoring and Discovery Plan that will be a standalone appendix to the HPTP. It will contain:
 - 1) A monitoring plan to be used during construction and reclamation

- 2) A discovery plan consistent with Stipulation VII to be used during the entire Undertaking.
 - 3) If appropriate, a monitoring plan to be used for post-construction monitoring in accordance with Stipulation IV.E. This plan will be developed in consultation with the Consulting Parties and will be added after treatment activities are concluded. Any reports resulting from post-construction monitoring will be submitted to the consulting parties in accordance with Stipulation XI.C.
 - 4) All monitoring shall have clearly stated objectives and methodologies for achieving those objectives, such as to ensure impact avoidance or minimization during construction and reclamation; to measure the effectiveness of avoidance, minimization and mitigation measures; to assess the effects of operations and maintenance activities, or to provide baseline information to help define treatments for historic properties with long-term concerns.
- j. A “Project Termination Plan” with provisions for the following programs to be implemented in the event that the undertaking is terminated for any reason:
- 1) A program outlining the steps to be taken in order to complete any data recovery that is in progress at the time of project termination; and
 - 2) A component outlining how analysis, interpretation, reporting, and curation for all historic properties will be completed.
- k. A Native American Graves Protection and Repatriation Act (of 1990 (25 U.S.C. 3002; 104 Stat. 3048; NAGPRA) Plan of Action (POA) which includes methods and procedures for the discovery and/or treatment of human remains, associated funerary objects, and sacred objects that reflect any concerns and/or conditions identified as a result of consultations between the BLM and the appropriate Tribes. This POA will be consistent with 36 CFR § 800.13, NAGPRA and:
- 1) In Arizona on non-federal land, methods and procedures will be consistent with A.R.S. § 41-844 and A.R.S. §41-865 along with ASM rules.
 - 2) In New Mexico on non-federal land, the methods and procedures will be consistent with NMSA 1978, § 18-6-11.2 and 4.10.11 NMAC.
 - 3) In Arizona, the Applicant, working through the ASM, shall obtain “burial agreements” with Indian tribes pursuant to A.R.S. § 41-844 and A.R.S. § 41-865, that govern discoveries of human remains and funerary objects on state and private lands. The ASM shall invite tribes expressing interest in the Undertaking to participate in development of burial agreements. The ASM shall provide

participating tribes, the Applicant and the BLM with a draft of the burial agreement for a 30 calendar day review.

- l. A strategy for cultural resource law and sensitivity training for all Undertaking personnel (including new, added, and replaced personnel) and contractors involved in transmission line construction, construction zone rehabilitation, operation, maintenance of this transmission line. Instruction will be to a degree commensurate with their involvement in the Undertaking and will include information on the statutes protecting cultural resources, resource sensitivity, and requirements to avoid damage to historic properties and to report discoveries of cultural resources in accordance with the monitoring and discovery plan. Indian tribes will be provided opportunities to participate in the training program, which could be offered by a variety of means including training sessions, video programs, or printed materials.
- m. A strategy for a public outreach program to disseminate information about the results of the cultural resource work to the general public. This program may include the following: a short report written specifically for the public, a brochure, exhibits for use at public outreach venues such as archaeology awareness fairs, slide or PowerPoint presentation, presentations to local historical and archaeological societies, website and/or social media content or a traveling museum exhibit.
- n. A variance review process to be used during operation and maintenance to address any changes in procedure that could have an adverse effect on historic properties in the ROW.
- o. A list of operation and maintenance activities that will not be subjected to additional Section 106 review.
- p. A list of operation and maintenance activities that would require additional Section 106 review.

B. Process for Developing the Historic Property Treatment Plan

1. The Applicant shall submit the draft HPTP to the BLM for initial review and comments. The BLM shall provide the SHPO and other Consulting Parties within each state a copy for review, requesting comments on the adequacy of the proposed treatment measures. These parties will have 30 calendar days to review and comment on the plan. If no comments are submitted to the BLM within the 30 calendar-day review period, concurrence with the draft HPTP will be assumed.
 - a. During this review time, the ASM shall invite tribes expressing interest in the Undertaking to participate in development of Burial Agreements. The ASM shall

provide participating tribes with a draft of the Burial Agreement for a 30 calendar day review.

- b. The BLM will convene at least one consultation meeting in each state with all interested Consulting Parties during the 30-day period.
2. The BLM shall consolidate the comments from Consulting Parties in each state and advise the Applicant of necessary revisions to the draft HPTP. The BLM shall ensure that all comments are taken into consideration in finalizing the HPTP and that the revised HPTP is distributed to all Consulting Parties for a 21 calendar-day review period. The BLM, in consultation with the SHPO, shall approve the final HPTP. The BLM will notify the Applicant and the Consulting Parties when the final HPTP has been approved.
- C. The BLM shall ensure that all measures in the HPTP are carried out, including data recovery, analyses of recovered materials, and all reporting requirements. The Applicant shall provide the BLM a Summary Report of treatment completed at each site. The Summary Report will include a brief characterization of site assemblage/contents, the types of analyses yet to be completed, and a brief description of how the provisions of the HPTP were implemented.
- D. The BLM shall review the Summary Report of treatment that has occurred at each site and provide a copy to the appropriate SHPO and all other Consulting Parties for review, requesting comments and concurrence with eligibility determinations for previously undetermined cultural resources and discoveries, within 15 calendar days. The BLM shall consider comments submitted during the review period and shall consult with the appropriate reviewer(s) to resolve differences and/or disagreements. If no comments are received within the 15 calendar-day review period, concurrence with the adequacy of the treatment described in the preliminary summary will be assumed.
- E. The BLM shall ensure that the Applicant prepares draft Treatment Reports for each state that incorporate the results of all the site-specific preliminary summaries into a comprehensive regional overview that can be addressed separately to each state. The Final Treatment Reports will also include:
 1. Post-treatment eligibility recommendations for historic properties that have been subjected to treatment measures.
 2. A listing of historic properties for which post-construction monitoring would be appropriate, and the reasons for this (i.e., proximity to Undertaking components with the potential for damage from operations and maintenance, percentage of property remaining in ROW, sensitivity of the property, a property identified as being of particular importance to a tribe(s), etc.).
 3. The objectives that monitoring could achieve as part of the effort to avoid, minimize, and/or mitigate adverse effects to those properties.

- F. The BLM shall review the draft Treatment Reports and provide a copy to the appropriate SHPO and other Consulting Parties for a 30 calendar-day review and comment period. The BLM shall consider comments received during the review period and shall consult with the appropriate reviewer(s) to resolve differences and/or disagreements. If no comments are received within 30 calendar days, concurrence with the adequacy of the Treatment Report will be inferred.
- G. The BLM shall ensure that the Applicant prepares a revised Treatment Report that considers comments received on the draft Treatment Report. The BLM shall review the revised Treatment Report and provide copies to the appropriate SHPO and other Consulting Parties for a 30 calendar-day review period. The BLM shall consider comments submitted during the review period and shall consult with the appropriate reviewer(s) to resolve differences and/or disagreements. If no comments are received within 30 calendar days, concurrence with the adequacy of the revised Treatment Report will be assumed and the revised Treatment Report shall be considered the final Treatment Report. The BLM shall notify the Applicant when the final Treatment Report has been accepted and will distribute it to the Consulting Parties, if necessary.
- H. During the Treatment phase, if deviations to the approved plan are warranted, then prior to implementation, proposed deviations from the HPTP will be submitted to the BLM for review. The BLM shall provide copies of the proposed deviation to the appropriate SHPO, the ASM and land manager(s) within the respective state for a 15-calendar day review. The BLM shall consider comments received within the review period and shall determine the adequacy of the proposed deviation. The BLM will notify the Applicant when the deviation has been approved.

V. Construction Variance Review Process

- A. All construction needs cannot be anticipated in advance, and areas required for additional work space, access roads, ancillary facilities, reroutes, etc. may be identified at any time following the acceptance of the Inventory Report(s) by the appropriate SHPO and land managing agencies. Any newly identified construction needs which would result in ground disturbing activities outside of the surveyed areas identified in the Inventory Report will result in the submission of a request for variance review to the BLM. The following process for review and approval of construction variances will be used.
 - 1. The APEs of all variance areas will be consistent with those defined in Stipulation I.A.
 - 2. All variance areas will be subject to a Class I Existing Data Inventory review, and a Class III Intensive Field Inventory.
 - 3. If the proposed variance will affect more than ten (10) acres of land or more than one (1) mile of road, the BLM will provide the Consulting Parties with a description and map of the variance.

- B. If no cultural resources or properties of traditional cultural or religious importance to tribes and ethnic groups are present within the variance APE, the results of the Class I and Class III inventories will be reported on BLM Form AZ-8110-4 Cultural Resource Project Record (for Arizona) or the New Mexico Cultural Resource Information System (NMCRIIS) Investigation Abstract Form (NIAF) (for New Mexico) prior to any access or use. The BLM will provide an expedited review of the variance request, not to exceed two (2) working days following receipt, and will provide the Applicant's cultural resources contractor with written approval/disapproval of the variance via electronic mail.
- C. If cultural resources or properties of traditional cultural or religious importance to tribes and ethnic groups are present within the variance APE, an Inventory Report, as defined in Stipulation I.C., above, will be prepared and submitted to BLM and the appropriate SHPO, tribes, and land manager for review. Understanding that variance requests may be necessary in the midst of construction activities, the agencies will provide an expedited review within five (5) working days or less. If no objections to the variance are received, at the end of the five day period, BLM shall provide the Applicant's cultural resources contractor with written approval of the variance via electronic mail. If objections are received, additional consultation regarding the variance will ensue in accordance with the provisions of this Agreement.
 - 1. If historic properties exist in the variance APE and cannot be avoided, a treatment plan for those properties will be developed and shall be consistent with the HPTP developed pursuant to Stipulation IV of this Agreement.
 - 2. Review procedures shall follow Stipulation IV.D.
 - 3. The supplemental treatment plan shall be incorporated into the HPTP and a preliminary summary report will be prepared and distributed in accordance with Stipulation IV.D.
 - 4. The BLM shall ensure that the results of such treatment efforts are reported in the final Treatment Report for the Undertaking.
 - 5. Once the BLM determines that the approved treatment has been completed, the BLM shall provide the Applicant's cultural resources contractor with written approval of the variance via electronic mail.

VI. Authorization of Construction

- A. **No Historic Properties Present:** Upon the BLM's acceptance of the final Inventory Report for each state, described in Stipulation II., the BLM, at its discretion, and pending compliance with all other applicable laws and regulations, may authorize the Applicant to begin construction on lands under any ownership or jurisdiction, subject to the appropriate jurisdiction's right-of-entry and ROW requirements, where there are no historic properties present.

- B. **No Adverse Effect:** Upon the BLM's acceptance of the final HPTP for each state, the BLM, at its discretion, and pending compliance with all other applicable laws and regulations, may authorize the Applicant to begin construction on lands under any ownership or jurisdiction, subject to the appropriate jurisdiction's right-of-entry and ROW requirements, where all effects to historic properties and unevaluated cultural resources will be avoided (as described in the approved HPTP) subject to the appropriate jurisdiction's right-of-entry and ROW requirements. Such authorization shall not preclude consideration of alternatives for treating historic properties in other segments.
- C. **Adverse Effect:** Following acceptance of the Summary Report of treatment that has occurred at each site described in Stipulation IV.E, the BLM, at its discretion, and pending compliance with all other applicable laws and regulations, may authorize the Applicant to begin construction on lands under any ownership or jurisdiction where provisions of the HPTP have been implemented, subject to the appropriate jurisdiction's right-of-entry and ROW requirements.

VII. Discoveries during the Undertaking

- A. If potential historic properties are discovered, or unanticipated effects occur to known historic properties, the BLM will implement the Monitoring and Discovery Plan. This plan will be included as a standalone appendix to the HPTP (see Stipulation IV.4.i) and will incorporate stipulations 1-4.
 - 1. The Applicant shall ensure that all surface-disturbing activities within 100 feet of the discovery immediately cease and that measures are taken to protect the cultural resources. The Applicant shall notify the BLM of the discovery within 24 hours. The BLM shall immediately notify the appropriate SHPO, tribe(s) and any other agency having jurisdiction over the land involved.
 - 2. If the discovered cultural resource is subsequently identified by an Indian tribe as a property of traditional religious and cultural importance, the BLM shall consult with the appropriate tribe(s).
 - 3. In Arizona on non-federal lands, the BLM shall ensure that the discoveries are treated according to A.R.S. § 41-844.
 - 4. In New Mexico on non-federal land, the BLM shall ensure that discoveries follow the process in 4.10.8.20 NMAC.
- B. Treatment of the discovered cultural resources shall be consistent with the HPTP developed pursuant to Stipulation IV of this Agreement and shall consider NRHP eligibility of the resource in accordance with 36 CFR § 800.13(c), which assumes eligibility.

1. A preliminary summary report with eligibility recommendations(s) will be prepared and distributed in accordance with Stipulation IV.D. The BLM shall ensure that the results of such treatment efforts are reported in the final Treatment Report for the Undertaking.
 2. Once the BLM determines that the approved treatment has been completed, the Applicant may resume construction upon receiving written authorization from the BLM.
- C. If human remains, funerary objects, or objects of cultural patrimony are discovered, BLM will follow the provisions of applicable, state and local laws, Burial Agreements (in Arizona) and the NAGPRA POA for the Undertaking, which will be included as an appendix to the HPTP.
1. In Arizona, the Applicant shall promptly report the discovery of human remains to the BLM, who shall notify the ASM Repatriation Coordinator pursuant to A.R.S. § 41-844 (state lands), and pursuant to A.R.S. § 41-865 (private lands).
 2. In New Mexico, the Applicant shall report the discovery of human remains to the BLM and local law enforcement and treat such discoveries of human remains on non-federal lands consistent with §18-6-11.2 of the *Cultural Properties Act NMSA, 1978*.
 3. Once the BLM has verified that the requirements of NAGPRA or of state laws governing nonfederal and nontribal lands have been met, the BLM may authorize the Applicant to proceed with construction.

VIII. Standards for Conducting and Reporting Work

- A. The BLM shall ensure that all work and reporting performed under this Agreement meets, at a minimum, the *Secretary of the Interior's Standards and Guidelines for Archaeological and Historic Preservation* (48 CFR 44716-44742, September 23, 1983) (the Secretary's Standards) and takes into consideration the ACHP's *Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites*, May 1999, *Procedures For Performing Cultural Resource Fieldwork On Public Lands in the Area of New Mexico State BLM Responsibilities* BLM Manual Supplement H-8100-1 and *Guidelines for Identifying Cultural Resources* BLM Manual H-8110 and *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, National Register *Bulletin* 38, 1989.
1. In Arizona, on state land, including municipalities, counties and other political subdivisions, all activities and documentation shall be consistent with the AAA, A.R.S §41-841 *et seq.* and the Arizona State Historic Preservation Act A.R.S. §41-861 *et seq.* along with rules for implementing the AAA and AZ SHPO guidance on implementing the Arizona State Historic Preservation Act, and, shall conform to specifications and guidelines contained in *Reporting Standards: Part I and Part II, Standards for Conducting and Reporting Cultural Resource Surveys on State Lands and Recommended Standards for Monitoring, Testing and Data Recovery*, available online at:

<http://www.statemuseum.arizona.edu/frame/index.php?doc=/crservices/standards.pdf>

Additionally, *AZ SHPO Standards for Documents Submitted for SHPO Review in Compliance with Historic Preservation Laws* (Revised December 2012) shall guide reports for all work done in Arizona, available online at:

http://azstateparks.com/SHPO/downloads/SHPO_2012_Report_Standards.pdf

2. In New Mexico, on state land, including municipalities, counties and other political subdivisions, all activities and documentation shall be consistent with the standards in rule 4.10.15 New Mexico Administrative Code (NMAC). All activities and documentation on state land shall be consistent with the appropriate state standards found in rules 4.10.8 NMAC, *Permits to Conduct Archaeological Investigations on State Land*; 4.10.15 NMAC, *Standards for Survey and Inventory*; 4.10.16 NMAC, *Standards for Excavation and Test Excavation*; and 4.10.17 NMAC, *Standards for Monitoring*. The rules are available online at:

<http://www.nmcpr.state.nm.us/nmac/parts/title04/04.010.0008.htm>

<http://www.nmcpr.state.nm.us/nmac/parts/title04/04.010.0015.htm>

<http://www.nmcpr.state.nm.us/nmac/parts/title04/04.010.0016.htm>

<http://www.nmcpr.state.nm.us/nmac/parts/title04/04.010.0017.htm>

- B. In Arizona, the Applicant shall ensure that its cultural resources contractor obtains an AAA project-specific permit from the ASM prior to excavating sites on state lands pursuant to A.R.S. §41-841 et. seq.
- C. In New Mexico, the Applicant shall ensure that its cultural resources contractor obtains a Project-specific excavation permit or other appropriate permit from the Cultural Properties Review Committee prior to excavating sites on state lands owned, operated or controlled by the State of New Mexico pursuant to §18-6-50 of the *Cultural Properties Act NMSA 1978*. For NMSLO lands the Applicant shall obtain the appropriate rights-of-entry from the NMSLO concurrently with the permit application. The Applicant shall ensure that its cultural resources contractor obtains a permit prior to excavating unmarked human burials on state or private land pursuant §18-6-11.2 of the *Cultural Properties Act NMSA 1978* or conducting mechanical excavation of archaeological sites on private land in the State of New Mexico pursuant to §18-6-11.2 of the *Cultural Properties Act NMSA 1978*.

IX. Confidentiality of Records

BLM will maintain confidentiality of sensitive information regarding historic properties to which a tribe attaches religious or cultural significance to the maximum extent allowed by federal and state law. However, any documents or records the BLM has in its possession are subject to the Freedom of Information Act (FOIA) (5 U.S.C. 552 et. seq.) and its exemptions, as applicable. In the event that a FOIA request is received for records or documents that relate to a historic property to which an Indian tribe attaches religious or cultural significance and that contain information that BLM is authorized to withhold from disclosure by other statutes including the

NHPA and the Archaeological Resources Protection Act, then, the BLM will consult with such tribe prior to making a determination in response to such a FOIA request not to withhold particular records and/or documents from disclosure.

X. Curation

The Applicant shall arrange curation agreements with repositories approved by the BLM. The BLM shall ensure that all artifacts and records resulting from the inventory and treatment program are curated in accordance with 36 CFR Part 79, except as determined through consultations with Indian tribes carried out in accordance with federal and state laws pertaining to the treatment and disposition of Native American human remains and funerary objects.

- A. All artifacts recovered from lands owned, controlled, or operated by the State of New Mexico, including associated records and documentation, shall be curated at the Museum of New Mexico, Museum of Indian Arts and Culture.
- B. All artifacts recovered from lands owned, controlled, or operated by the State of Arizona, including associated records and documentation, shall be curated at the Arizona State Museum and in accordance with the standards and guidelines required by ASM.

XI. Undertaking Monitoring, Annual Reporting, and Evaluation

The BLM will be responsible for monitoring activities associated with this Undertaking on all jurisdictions during construction and reclamation.

- A. The BLM will select a 10 percent sample of cultural resources found during the inventory and conduct field inspections while accompanied by the Cultural Resources Contractor (CRC) to provide input regarding NRHP eligibility and possible future treatment options.
- B. The BLM will select a 10 percent sample of historic properties identified for mitigation of adverse effects, and conduct field inspections at those historic properties to ensure adequate implementation of the HPTP for those historic properties.
- C. The lead BLM office shall prepare an annual letter report of cultural resources activities pertaining to this Undertaking for all Consulting Parties by December 31 for the duration of this PA. The annual letter report will include an update on project schedule, status, and any ongoing relevant cultural resources monitoring or mitigation activities, discovery situations, or outstanding tasks to be completed under this Agreement or the HPTP. The implementation and operation of this PA shall be evaluated on an annual basis by the Consulting Parties. This evaluation, to be conducted after the receipt of the BLM letter report, may include in-person meetings or conference calls among these parties, and suggestions for possible modifications or amendments to this Agreement.
- D. The BLM shall monitor activities pursuant to this Agreement. Terms and conditions of monitoring activities are described in the Monitoring and Discovery Plan. Should the

Applicant or its cultural resources contractor fail to comply with any provision of this Agreement, the BLM may, at its discretion, counsel the Applicant and/or its cultural resources contractor regarding performance requirements, or suspend the permit under which this Agreement is executed. Such suspension would result in the issuance of a “stop work” order for the entire Project.

- E. The BLM will retain responsibility to inspect for compliance with the terms and conditions of the BLM ROW grant pertaining to historic properties, and that the appropriate cultural resources specialist will participate in these compliance reviews, for the life of the grant.

XII. Operation and Maintenance of the Transmission Line and Facilities

- A. After construction of the transmission lines, the Applicant (ROW grant holder) will be required to follow all of the terms, conditions and stipulations concerning the operation, maintenance and decommissioning of the lines which are included in the Plan of Development (POD) and the ROW grants. These terms, conditions and stipulations will include any provisions identified in the HPTP that resolve potential adverse effects to historic properties identified within the ROW.
 - 1. The BLM will be responsible for ensuring that the stipulations in the BLM ROW grant are enforced.
 - 2. The ASLD will be responsible for ensuring that the stipulations in their ROW grant are enforced on ASLD administered lands.
 - 3. The NMSLO will be responsible for ensuring that the stipulations in their ROW grant are enforced on NMSLO administered lands.
- B. Post-construction evaluation and management of historic properties: see Stipulation IV.E.
- C. Should any variance be necessary during operations and maintenance, the variance procedure in the HPTP will be followed and a BLM cultural resource specialist will review the action and make recommendations regarding potential effects and appropriate actions to avoid, minimize, or mitigate any adverse impacts (e.g., using hand tools if mechanical vegetation treatments are proposed in sensitive areas).

XIII. Decommissioning

Should decommissioning of the transmission line and associated facilities be deemed necessary, the ROW grant shall stipulate and the BLM shall ensure that it will be considered a new action for Section 106 review, and that historic properties potentially affected by decommissioning will be considered in the BLM approved Termination and Reclamation Plan in accordance with the pertinent laws, regulations, and policies extant at the time.

XIV. Dispute Resolution

Should any Consulting Party to this PA object at any time to any actions proposed or the manner in which the terms of this PA are implemented, the BLM shall consult with such party to resolve the objection. If the BLM determines that such objection cannot be resolved, the BLM will:

- A. Forward all documentation relevant to the dispute, including the BLM's proposed resolution, to the ACHP. The ACHP shall provide BLM with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, BLM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, Consulting Parties, and provide them with a copy of this written response. BLM will then proceed according to its final decision.
- B. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, the BLM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the BLM shall prepare a written response that takes into account any timely comments regarding the dispute from the Consulting Parties to the PA, and provide them and the ACHP with a copy of such written response.
- C. The BLM will be responsible for carrying out all other actions subject to the terms of this PA that are not the subject of the dispute.

XV. Amendments and Termination

- A. Any Signatory or Invited Signatory to this Agreement may request that it be amended by informing BLM in writing of the reason for the request and the proposed amendment language, whereupon BLM shall inform the other parties and request their views concerning the proposed amendment. All Signatories and Invited Signatories must agree to the amendment before it shall take effect.
- B. Any Signatory or Invited Signatory to this Agreement may terminate it by providing 30 calendar days written notice to the other Signatories and Invited Signatories, provided that they consult during the 30 calendar-day period prior to termination to seek agreement on amendments or other actions that would avoid termination.
- C. In the event that this Agreement is terminated, the BLM shall comply with 36 CFR § 800.3 through 800.7 with regard to individual actions covered by this Agreement.

XVI. Term of the Agreement

This PA will expire if the Undertaking has not been initiated within 3 years of the signing of this PA, or the BLM ROW grant expires or is withdrawn. Otherwise, this Agreement shall take effect from the date of execution and will remain in effect for 15 years or until acceptance of the final Treatment Reports by the Signatories.

The Execution and Implementation of this Agreement evidences that the BLM, as lead federal agency, has satisfied its Section 106 responsibilities with regard to the construction, operation, and maintenance of the SunZia Transmission Project.

Nothing in this agreement may be construed to obligate either party to any current or future expenditure of resources in advance of the availability of appropriations from Congress. Nor does this agreement obligate the parties to expend, exchange, or reimburse funds, services, or supplies or transfer or receive anything of value on any particular project or purpose, even if funds are available. Subject to the availability of funding, each party intends to assume responsibility for its respective costs arising from any activity related to this Programmatic of Agreement, including cost of transportation, lodging, board, and salary of personnel involved.

SIGNATURES

SIGNATORIES:

BUREAU OF LAND MANAGEMENT, NEW MEXICO STATE OFFICE
 ARIZONA STATE HISTORIC PRESERVATION OFFICER
 NEW MEXICO STATE HISTORIC PRESERVATION OFFICER
 ADVISORY COUNCIL ON HISTORIC PRESERVATION

INVITED SIGNATORIES:

SUNZIA TRANSMISSION, LLC.
 ARIZONA STATE LAND DEPARTMENT
 ARIZONA STATE MUSEUM
 NEW MEXICO STATE LAND OFFICE
 ARIZONA DEPARTMENT OF TRANSPORTATION
 NEW MEXICO DEPARTMENT OF TRANSPORTATION
 ARMY CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT

CONCURRING PARTIES:

TOHONO O'ODHAM NATION
 SALT RIVER PIMA-MARICOPA INDIAN COMMUNITY
 GILA RIVER INDIAN COMMUNITY
 ISLETA DEL SUR TRIBAL GOVERNMENT
 WHITE MOUNTAIN APACHE TRIBE
 COMANCHE INDIAN TRIBE
 FORT SILL APACHE TRIBE OF OKLAHOMA
 KIOWA TRIBE OF OKLAHOMA
 MESCALERO APACHE TRIBE
 PUBELO OF ISLETA
 HOPI TRIBAL COUNCIL
 SAN CARLOS APACHE TRIBE
 ARIZONA ARCHAEOLOGICAL COUNCIL
 NEW MEXICO ARCHAEOLOGICAL COUNCIL
 NATIONAL TRUST FOR HISTORIC PRESERVATION
 CAMINO REAL DE TIERRA ADENTRO TRAIL ASSOCIATION (CARTA)
 ARCHAEOLOGY SOUTHWEST
 CASCABEL WORKING GROUP
 WHITE SANDS MISSILE RANGE
 ALLIANCE FOR REGIONAL MILITARY SUPPORT (ARMS)
 PIMA COUNTY

**ATTACHMENT 1:
UNDERTAKING DESCRIPTION**

The SunZia Southwest Transmission Project will include up to two new, single-circuit 500 kV transmission lines located within a single right-of-way up to 1,000 feet wide (typically 400 feet wide) over a lease term of 50 years. The approximately 500-mile-long transmission line route will originate at the proposed SunZia East Substation in Lincoln County, New Mexico, and terminate at the Pinal Central Substation in Pinal County, Arizona. The Project would be located within Lincoln, Socorro, Sierra, Luna, Grant, Hidalgo, and/or Torrance counties in New Mexico; and Graham, Greenlee, Cochise, Pinal, and/or Pima counties in Arizona, on Federal (BLM), State, and private lands. SunZia would construct, operate, and maintain up to two, parallel overhead 500 kV transmission lines and related facilities. The purpose of the proposed project is to transport electricity generated by renewable and other resources to western power markets and load centers.

ATTACHMENT 2: MAP OF PROJECT AREA

ATTACHMENT 3: DEFINITIONS USED IN THIS PA

Adverse Effect – Alteration of the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Places.

Area of Potential Effect (APE) – The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR § 800.16(d)).

Authorized Officer – The Authorized Officer for this undertaking is the BLM New Mexico State Director and/or his or her delegated representative.

Consultation – The process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters that arise in the Section 106 process. The Secretary's "Standards and Guidelines for Federal Agency Preservation Programs pursuant to the National Historic Preservation Act" provide further guidance on consultation.

Consulting Party – Any party that has participated in the development of this PA (i.e., Concurring Party, Invited Signatory, and Signatory) and has signed the PA in concurrence.

Signatory – Parties who have legal or financial responsibilities for completions of stipulations of the Agreement. The signatories have sole authority to execute the Agreement, and together with the invited signatories, to amend or terminate the Agreement.

Invited Signatory – The authorized official may invite additional parties to sign the agreement and they have the same rights with regard to amendments and termination as the signatories. These parties have legal responsibility in terms of the Project, such as the issuance of a permit, license or ROW, and they have a compliance responsibility under the NHPA or a state cultural resource statute.

Concurring Party – A party who signs this Agreement but is not legally, or financially, responsible for completion of stipulations set forth in the Agreement. The refusal of any party invited to concur in the Agreement does not invalidate the Agreement.

Construction – The construction phase begins when BLM has issued a ROW grant to the proponent for the Undertaking. It includes all activities related to construction of the undertaking, including activities required to be completed in advance of construction, as well as all activities completed in order to reclaim lands disturbed during construction for two years after construction is completed or until cost recovery agreements related to construction expire.

Cultural Resource – Any location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence that is older than 50 years. The term includes archaeological, historic, or architectural sites, landscapes, buildings, structures, objects, and places

that possess historic and/or cultural significance as well as places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. They may be but are not necessarily eligible for the NRHP; these properties have not been evaluated for NRHP eligibility.

Cultural Resource Consultant/Contractor (CRC) – A qualified and permitted professional consultant in cultural resources (archaeologist, historian, ethnographer, historic architect, architectural historian, or anthropologist) who is responsible for implementing cultural resource inventories and who prepares cultural resource documents, reports, analysis, records, and professional literature. CRCs must meet the Secretary of the Interior's Professional Qualification Standards and hold appropriate permits from land managing agencies.

Cultural Resource Inventory (from H-8100-1) –

Class I – Existing data inventory. Large-scale review of known cultural resource data

Class II – Sampling field inventory. Sample oriented field inventory

Class III – Intensive field inventory. A complete surface inventory of a specific area involving a systematic field examination of an area to gather information regarding the number, location, condition, distribution, and significance of cultural resources present, typically requiring a systematic pedestrian review of an area with transect intervals that shall not exceed 50' (15 meters). Also referred to as a Class III survey, Class III Inventory, or intensive level survey.

Decommissioning – The action in which the transmission line(s) and/or related facilities such as substations are taken out of commission (cease to operate) and are physically dismantled

Discovery – A previously unknown cultural resource identified in the APE during construction, subsequent to the Class III Inventory.

Effects are alterations to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP.

Direct effects are caused by the undertaking and occur at the same time and place.

Indirect effects are also caused by the undertaking and are effects that may be visual, atmospheric, or audible that could diminish the integrity of the properties for which setting feeling, and/or association are qualifying characteristics of NRHP eligibility. Additional roads and visitors to the area (construction personnel, recreationists, etc.) also increase opportunities for effects from pot hunting, vandalism of historic properties, and disruption of spiritually important sites.

Cumulative effects are the impacts on cultural resources which results from the incremental impact of the Undertaking when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions [per 40.CFR1508.7]. The APE for cumulative effects may be direct or indirect and result from incremental effects related to the Undertaking over time (e.g. increased access because of new

roads, future transmission lines along the same corridor, new projects feeding into the Undertaking, etc.).

Eligible (for Inclusion in the National Register) – Includes both properties formally determined as such in accordance with regulations of the Secretary of the Interior and all other properties that meet the National Register criteria as determined by the Federal Agency in consultation with SHPO and other parties.

Historic Property – Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

Historic Property(ies) Treatment Plan (HPTP) – A document that details the procedures and techniques for resolving adverse effects to historic properties within the APE through avoidance, minimization, and/or mitigation.

Indian Tribe – Any Indian tribe, band, nation, or other organized group or community, including a native village, regional corporation, or village corporation, as those terms are defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

Inventory Report – The inventory report documents the results of the cultural resources inventory detailing the areas surveyed, the methodologies used, the cultural framework of the project area and the cultural resources discovered and documented. It includes assessments of direct, indirect and cumulative effects within the APE of the Undertaking. It also provides recommendations on National Register eligibility of all of the cultural resources within the inventoried area.

Monitoring and Discovery Plan – The Monitoring and Discovery Plan is a component of the HPTP and a) provides a detailed plan to monitor compliance with stipulations of the HPTP to avoid, minimize, or mitigate adverse effects of the Undertaking, b) may include specific plans where monitoring is necessary to help resolve adverse effects to historic properties, c) establishes procedures to follow in the event that previously undiscovered cultural resources are encountered during the Undertaking, and d) includes a POA developed specifically to address the handling of human remains pursuant to the Native American Graves Protection and Repatriation Act (NAGPRA) and applicable state laws. All monitoring plans shall explicitly state the objectives of the monitoring and provide a methodology for attaining these objectives.

Monitoring Report – A document that summarizes the results of monitoring activities performed as outlined within the HPTP.

NAGPRA Plan of Action (POA) – A document that establishes procedures for ensuring the proper treatment of Native American remains and related grave goods encountered on Federal lands pursuant to 43 CFR § 10.

National Register – The National Register of Historic Places is the official list of the Nation's prehistoric and historic places worthy of preservation including districts, cultural resources, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture and is maintained by the Secretary of the Interior.

National Register Criteria – The criteria of significance established by the Secretary of the Interior for use in evaluating the eligibility of properties for inclusion in the National Register (36 CFR § 60).

Operations and Maintenance – Activities associated with operation and maintenance of the approved ROW grant over the life of the ROW grant. This includes all activities related to the functioning of the Undertaking after construction and reclamation are completed and prior to any activities related to decommissioning of the Undertaking, per Stipulation XII. Activities during this time are generally infrequent, predictable, and routine. Any actions not specifically approved in the ROW grant, such as changes in equipment used or actions outside the ROW, require approval of the BLM.

Plan of Development (POD) – The Final POD is a BLM approved document that will be an enforceable term and condition as part of the BLM approved right-of-way authorization. Contributors in the development of the Final POD prior to construction will include the Arizona State Land Department and New Mexico State Land Office. The Arizona and New Mexico surface managing agencies will be responsible for developing and enforcing their respective stipulations as they deem necessary to mitigate natural and cultural resource impacts, on state administered lands. Should the Arizona and New Mexico agencies choose to adopt the terms, conditions, and special stipulations as outlined in the Final POD on their respective state authorized rights-of-ways, responsibility to enforce these Final POD terms, conditions, and stipulations is strictly their sole responsibility. Enforcement will be between the state agency and the applicant.

Programmatic Agreement – A document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex Project or other situations in accordance with 36 CFR § 800.14(b).

Right-of-Way grant, (ROW) – An easement of land granted for certain rights of use without possessing it. The PA and the HPTP are appended to the POD, which is an essential component of the ROW grant.

Section 106 – Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by ACHP. Revised regulations, "Protection of Historic Properties" (36 CFR Part 800), became effective August 5, 2004.

State Historic Preservation Officer (SHPO) – The official appointed or designated pursuant to section 101(b)(1) of the act to administer the State Historic Preservation Program or a representative designated to act for the State Historic Preservation Officer.

Summary Report – A document that summarizes results of treatment activities undertaken on an individual historic property for the purposes of informing the agency and Consulting Parties for the purposes of gaining approval for the Project to go forward prior to the acceptance of the final Treatment Report.

Treatment Report – A document that presents the complete results of the treatment activities performed on all historic properties (and any undetermined cultural resources for which additional studies were performed to determine eligibility) that addresses the research questions developed in the Treatment Plan and synthesizes the results into a regional overview of the Project Area.

Undertaking – A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval. The Undertaking may include surveys, geotechnical testing, engineering, mitigation planning and design, or other activities initiated prior to construction of project facilities.